A paper prepared for the

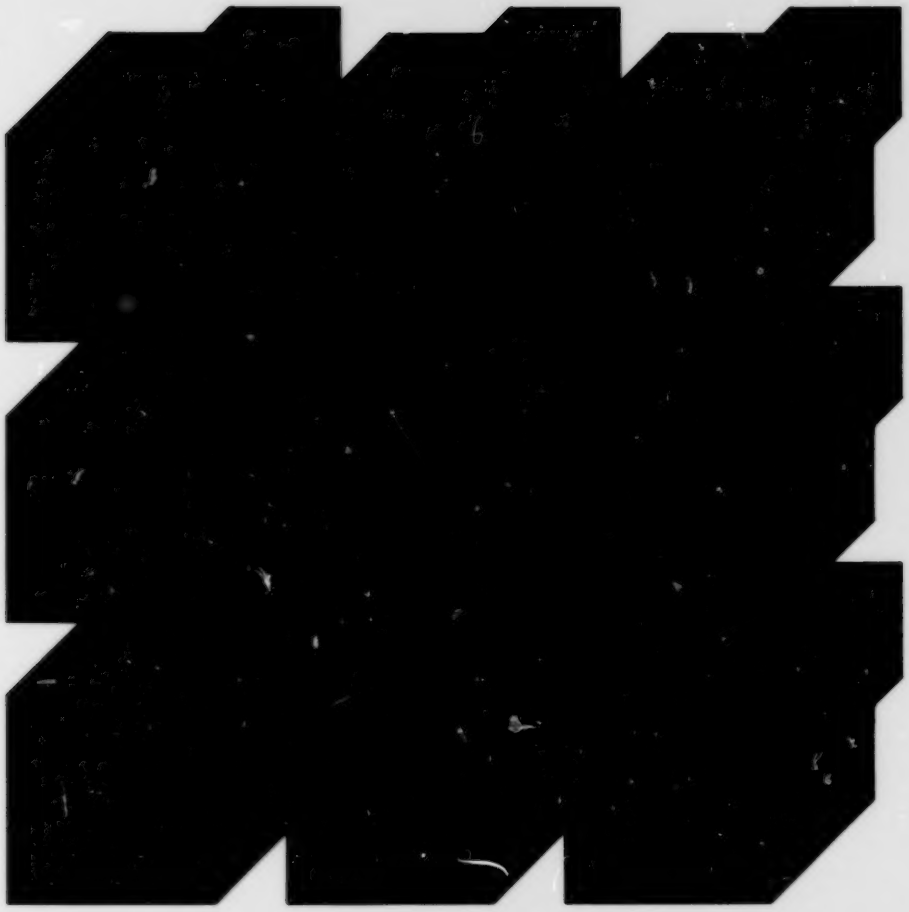
Economic Council of Canada

P.O. Box 527
Ottawa, Ontario
K1P 5V6

Un document préparé pour le

Conseil économique du Canada

C.P. 527
Ottawa (Ontario)
K1P 5V6



87-05957/

The **Economic Council of Canada** was established in 1963 by Act of Parliament. The Council is a crown corporation consisting of a Chairman, two Directors and not more than twenty-five Members appointed by the Governor in Council.

The Council is an independent advisory body with broad terms of reference to study, advise and report on a very wide range of matters relating to Canada's economic development. The Council is empowered to conduct studies and inquiries on its own initiative, or if directed to do so by the Minister, and to report on these activities. The Council is required to publish annually a review of medium- and long-term economic prospects and problems. In addition it may publish such other studies and reports as it sees fit.

The Chairman is the Chief Executive Officer of the Council and has supervision over and direction of the work and staff of the Council. The expenses of the Council are paid out of money appropriated by Parliament for the purpose.

The Council as a corporate body bears final responsibility for the *Annual Review*, and for certain other reports which are clearly designated as *Council Reports*. The Council also publishes *Research Studies*, *Discussion Papers* and *Conference Proceedings* which are clearly attributed to individual authors rather than the Council as a whole. While the Council establishes general policy regarding such studies, it is the Chairman of the Council who bears final responsibility for the decision to publish authored research studies, discussion papers and conference proceedings under the imprint of the Council. The Chairman, in reaching a judgment on the competence and relevance of each author-attributed study or paper, is advised by the two Directors. In addition, for *authored Research Studies* the Chairman and the two Directors weigh the views of expert outside readers who report in confidence on the quality of the work. Publication of an author-attributed study or paper signifies that it is deemed a competent treatment worthy of public consideration, but does not imply endorsement of conclusions or recommendations by either the Chairman or Council members.

Établi en 1963 par une Loi du Parlement, le **Conseil économique du Canada** est une corporation de la Couronne composée d'un président, de deux directeurs et d'au plus vingt-cinq autres membres, qui sont nommés par le gouverneur en conseil.

Le Conseil est un organisme consultatif indépendant dont le mandat lui enjoint de faire des études, donner des avis et dresser des rapports concernant une grande variété de questions rattachées au développement économique du Canada. Le Conseil est autorisé à entreprendre des études et des enquêtes, de sa propre initiative ou à la demande du Ministre, et à faire rapport de ses activités. Chaque année, il doit préparer et faire publier un exposé sur les perspectives et les problèmes économiques à long et à moyen termes. Il peut aussi faire publier les études et les rapports dont la publication lui semble opportune.

Le président est le directeur général du Conseil; il en surveille les travaux et en dirige le personnel. Les montants requis pour acquitter les dépenses du Conseil sont prélevés sur les crédits que le Parlement vote à cette fin.

En tant que personne morale, le Conseil assume l'entière responsabilité des *Exposés annuels*, ainsi que de certains autres rapports qui sont clairement désignés comme étant des *Rapports du Conseil*. Figurent également au nombre des publications du Conseil, les *Études*, *Documents* et *Comptes rendus de colloques*, qui sont explicitement *attribués à des auteurs particuliers* plutôt qu'au Conseil lui-même. Celui-ci établit une politique générale touchant ces textes, mais c'est au président qu'il incombe de prendre la décision finale de faire publier, sous les auspices du Conseil économique du Canada, les ouvrages à nom d'auteur tels que les études, documents et rapports de colloques. Pour se prononcer sur la qualité, l'exactitude et l'objectivité d'une étude ou d'un document attribué à son auteur, le président est conseillé par les deux directeurs. De plus, dans le cas des *études à nom d'auteur*, le président et les deux directeurs sollicitent l'avis de lecteurs extérieurs spécialisés, qui font un rapport confidentiel sur la qualité de ces ouvrages. Le fait de publier une étude ou un document à nom d'auteur ne signifie pas que le président ou les membres du Conseil souscrivent aux conclusions ou recommandations contenues dans l'ouvrage, mais plutôt que l'analyse est jugée d'une qualité suffisante pour être portée à l'attention du public.

DISCUSSION PAPER NO. 333

Depository Institutions:
Risks and Insolvencies

by

H.H. Binhammer

The findings of this Discussion Paper are the personal responsibility of the author(s) and, as such, have not been endorsed by the members of the Economic Council of Canada.

Discussion Papers are working documents made available by the Council, in limited number and in the language of preparation, to interested individuals for the benefit of their professional comments.

La série "Documents" contient des documents de travail dont le Conseil fait une diffusion restreinte, dans leur version d'origine, en vue de susciter des commentaires de la part de spécialistes.

Requests for permission to reproduce or excerpt this material should be addressed to:

Director of Information
Economic Council of Canada
Post Office Box 527
Ottawa, Ontario
K1P 5V6

ISSN-0225-8013

August 1987

Résumé

LES INSTITUTIONS DE DÉPÔTS - RISQUES ET INSOLVABILITÉ

Depuis les années 70, la transformation des avoirs par les institutions de dépôts a évolué et s'est adaptée à un nouveau contexte caractérisé par une inflation accélérée et prévue, l'instabilité des taux d'intérêt et un accroissement de la concurrence sous l'effet du progrès technologique et des innovations financières. Au cours du processus, ces institutions ont été exposées de plus en plus aux risques, ce qui les a rendues plus vulnérables à l'échec.

Le présent document définit six grands types de risques auxquels font face les institutions de dépôts : il s'agit des risques liés au crédit, aux taux d'intérêt, au financement, au passif éventuel, à la gestion et aux prestations de services. Il examine les principaux facteurs relatifs aux institutions et aux marchés, qui ont peut-être modifié le profil de risque de ces institutions et influé sur leurs tentatives pour contrôler leur exposition aux risques.

L'auteur évalue les diverses définitions de l'insolvabilité des institutions et des modalités de fermeture. Bien que les définitions juridiques de l'insolvabilité soient ambiguës, les procédures qui précèdent la fermeture ont permis aux organismes de réglementation ainsi qu'aux tribunaux d'explorer suffisamment la

viabilité éventuelle d'une institution en difficulté ainsi que les facteurs externes liés à la fermeture. Toutefois, l'auteur soutient que la Société d'assurance-dépôts du Canada devrait être autorisée à jouer un rôle plus direct dans la détermination de l'insolvabilité et de la fermeture. En outre, l'utilisation, par cette institution, d'accords avec des sociétés mandataires et d'ententes administratives, en vue de dissoudre des institutions ayant fait faillite, devrait être une exception à la liquidation immédiate plutôt que la règle.

On ne s'entend pas sur la quantité de capital qui permettrait de maintenir la confiance dans le système des institutions de dépôts, non plus que sur les articles du bilan d'une institution qui peuvent le mieux y contribuer. Le document explore certaines des questions concernant les normes de suffisance du capital et examine les ratios de levier financier de certaines institutions canadiennes.

Les organismes qui réglementent les institutions de dépôts estiment que leur mandat de veiller à la "sécurité et à la solvabilité" de ces institutions consiste à empêcher leur faillite. Le Document se fonde sur l'expérience américaine et sur les écrits au sujet des modèles de prédiction des faillites, en vue de justifier des examens sur place ainsi que le recours à des systèmes de pré-alerte.

Dans l'analyse du cadre de réglementation pour la prévention des faillites, les propositions de réduire les incitations à prendre

des risques exagérés comprennent des réformes à apporter au régime d'assurance-dépôts, aux règles de divulgation ainsi qu'à l'auto-réglementation prévue par le mandat des institutions financières.

Enfin, l'étude fait valoir que le cadre de réglementation ne peut pas, et ne devrait pas, refuser aux diverses institutions de dépôts le droit de sortir du système, lequel peut avoir une valeur thérapeutique et disciplinaire. La politique publique doit permettre aux institutions non solvables et mal gérées de faire faillite, mais elle doit en même temps assurer la sécurité et la solvabilité du système financier.

DEPOSITORY INSTITUTIONS: RISKS AND INSOLVENCIES

Abstract

Starting in the 1970s, the asset transformation performed by depository institutions changed to accommodate itself to a new environment of accelerated and anticipated inflation, interest rate volatility, and more competition fostered by technological and financial innovation. In the process these institutions increased their exposure to risk which made them more vulnerable to failure.

This paper defines six major types of risk-credit risk, interest rate risk, funding risk, contingent liability risk, management risk and delivery risk - faced by depository intermediaries. It considers the major institutional and market factors that may have changed the risk profile of these institutions and their attempt to manage their exposure to risk.

The various definitions of institutional insolvency and procedures for closure are assessed. Despite the ambiguity of the legal definitions of insolvency, the procedures used before closure applies have allowed the regulators and the courts to adequately explore the potential viability of a problem institution and the externalities associated with closure. However, it is argued that the Canada Deposit Insurance Corporation should be authorized to play a more direct role in determining insolvency and closure. Moreover, the Corporation's use of agency and administration agreements for winding-down failed institutions should be the exception to immediate liquidation rather than the rule.

Disagreement exists concerning both the appropriate amount of capital adequate for maintaining confidence in the depository system and the items on an institution's balance sheet that best serve this purpose. The Paper explores some of the issues with respect to capital adequacy standards and examines the capital leverage ratios of some Canadian institutions.

Regulatory agencies of depository institutions interpret their "safety-and-soundness" mandate as one of failure prevention. The Paper draws on American experience and the literature on failure prediction models to make a case for on-site-examinations and the use of early warning systems.

In the discussion of the regulatory framework for failure prevention, proposals for reducing incentives towards excessive risk taking include reforms to the deposit insurance system, disclosure rules and mandated self-regulation.

Finally, it is argued that the regulatory framework cannot, and should not, make individual depository institutions immune from the therapeutic and disciplinary role of exit. Public policy must allow unsound and poorly managed institutions to fail, but at the same time protect the safety and soundness of the financial system.

CONTENTS

		Page
FOREWORD		ix
I	INTRODUCTION	1
II	INSTITUTIONAL RISK AND ITS MANAGEMENT	4
	Credit Risk	4
	Interest Rate Risk	15
	Funding Risk	22
	Contingent Liability Risk	25
	Management Risk	27
	Delivery Risk	32
III	INSTITUTIONAL INSOLVENCY AND CAPITAL ADEQUACY	34
	Insolvency and Closure	34
	Capital Adequacy	41
IV	FAILURE PREVENTION: EXAMINATION AND EARLY WARNING SYSTEMS	52
V	THE REGULATORY FRAMEWORK FOR FAILURE PREVENTION	58
	Deposit Insurance	58
	Canada Deposit Insurance (C.D.I.C.): Operations and Loss Experience	68
	Solvency Regulations	74
	Disclosure Rules	80
	Self-Regulation	81
CONCLUSIONS		82
FOOTNOTES		85
REFERENCES		90

FOREWORD

This paper is one of the outputs from the Council's eighteen month study of the Canadian financial system and the regulation of financial institutions. The decision by the Economic Council of Canada to undertake a major study of the financial system in Canada was motivated by several factors. The most important of these was the fundamental changes taking place in the operations of financial institutions and markets that produced increased diversification and competition, while at the same time a number of institutions were facing insolvency.

In March of this year, the Council published the detailed results of this study in a research report entitled A Framework for Financial Regulation. Based on this research, in November 1986, the Council had published a statement entitled Competition and Solvency: A Framework for Financial Regulation which contained 31 recommendations designed to improve the framework of financial regulation, to improve public confidence in the stability of the financial system and to promote competition. Public confidence in the operation of the financial system is a crucial ingredient for its efficient operation and insolvencies of financial institutions can severely damage that confidence as well as imposing severe hardship on those who had placed their trust in these institutions. An evaluation of risks undertaken by financial institutions and of the mechanisms in place to control those risks and to minimize loss to depositors when an institution fails is the objective of this present study.

H.H. Binhammer is Dean of Arts and Professor of Economics at the Royal Military College of Canada at Kingston. He has many publications in the field of financial institutions including several editions of a textbook on money and banking.

Judith Maxwell
Chairman

I - INTRODUCTION

An essential function of financial institutions is to facilitate the transfer of funds between surplus and deficit spending units to allow them to reorder intertemporaly their consumption pattern from that possible by their expected lifetime earning or income pattern. Financial institutions are involved in this process as market intermediaries and financial intermediaries. The essential difference between these two types of intermediaries is that financial intermediation involves asset transformation.

There are two basic kinds or types of asset transformation: payment intermediation and maturity-risk transformation, both of which fall under the rubric of financial intermediation. (see Bryant (1980), Diamond and Dybvig (1983), Merrick and Saunders (1985)). Payments intermediation is known as banking undertaken by so-called depository institutions which in Canada includes the chartered banks, trust companies, mortgage loan companies, credit unions and caisses populaires. These institutions engage in payments intermediation when they hold portfolios of financial assets against which they issue claims in the form of deposits which serve as a medium of exchange. The most important payments intermediary, aside from the private depository institutions, is the central bank which holds financial assets of the federal government against which it issues claims in the form of currency and deposits held by a specified group of private financial institutions as reserves and clearing balances.

Maturity-risk intermediation refers to the transformation of assets where institutions hold assets and issue claims which have different characteristics with respect to denomination, term and capital value. Denomination intermediation takes place when a financial institution provides

funds to borrowers in different denominations from the sources of their funds. Term intermediation results when a financial institution supplies funds for a different term than that for which they have been borrowed. Capital value intermediation occurs when a financial institution lends (borrows) at fixed rates and borrows (lends) at variable rates.

Asset transformation is a market solution for optimal risk sharing among people with different consumption patterns. Because the public holds a preponderance of illiquid assets it faces the risk of being illiquid and hence unable to satisfy its desired consumption patterns. With asymetrical states of information, these risks are not publicly verifiable and can therefore not be directly insured. An alternative is asset transformation where financial intermediaries exchange their liquid assets for the public's illiquid assets. In this way financial intermediaries assume some of the public's illiquidity risk. However, efficient risk sharing by private sector financial intermediaries depends critically on the public's confidence in the continued solvency of these institutions.

Unlike insolvency by real sector firms, that by individual depository intermediaries has much broader implications for economic welfare because of the so called "contagion effect". This effect refers to the possibility that insolvency and the inability of one institution to honour its liability contracts affects the solvency of other intermediairies. In the case of depository institutions, if one institution is unable to redeem its deposits and the public perceive that other institutions may do likewise, those who need not withdraw (have no liquidity need) will find it optimal to withdraw based on their perception because institutions use a sequential serving rule in honouring deposit redemption. Hence the solvency of all depository institutions can be threatened by the insolvency of one or a small group of institutions and prudent

management of a single institution is not necessarily sufficient to protect it from failure.

Another feature of depository institutions which separates them from other types of business is their central role in the payments system. A peculiar aspect of this system, as with the telephone, is that a user's benefit depends upon the extent to which it is utilized by others. This is optimized when depositors have confidence in the soundness of depository institutions. This is an additional reason why the solvency of these institutions is an important concern for public policy.

The remainder of this study is organized as follows. Section II presents a discussion of the risks faced by the depository intermediaries which affects their solvency. Major institutional and market factors that may have changed the risk profile of these institutions are considered as well as the ways in which the institutions have attempted to manage their risks. Section III deals with institutional insolvency and capital adequacy. Early warning systems are reviewed in Section IV. Section V considers the role of deposit insurance and other regulatory changes proposed to satisfy the safety and soundness of the financial system for purposes of asset transformation and optimal risk sharing.

II - INSTITUTIONAL RISK AND ITS MANAGEMENT

In the 1970's, induced by accelerated and anticipated inflation, and greater competition fostered in large part by technological and financial innovations at home and abroad, depository institutions' asset transformation function changed to accommodate itself to this new environment. While this increased their traditional risks, it also exposed them to new risks calling for new approaches for their management. Risks that can threaten an institution's solvency can be classified into six major categories: credit risk, interest rate risk, funding risk, contingent liability risk, management risk and delivery risk.

(i) Credit Risk

All financial intermediaries are exposed to credit risk; that is, the risk of borrowers defaulting on the payment of principal and interest. An institution's exposure to credit risk depends upon the risk associated with any one loan or investment and the average default risk of its asset portfolio.

Before the 1970's the preponderance of chartered bank lending took the form of commercial loans which were considered to be self-liquidating insofar as they financed business inventories and current operating expenditures. Moreover, these loans were extended to businesses against rather conservative lines of credit based on the borrower's credit worthiness and the quality and amount of collateral available. Aside from carefully monitoring the default risk of individual loans, the banks managed the composition of their loans to control the average default risk of their asset portfolios. This implied selecting loans or activities where the correlation among the activities is either negative or slight. Portfolio diversification presented few problems insofar as their operations were national in scope. Moreover, without pressures

of competition, the banks could be selective in loan placement and usually restricted the size of any one loan to a relatively small proportion of their capital or equity base. From the point of view of the chartered banks' exposure to credit risk, their solvency remained unquestionable.

Today the solvency of all the chartered banks can no longer be considered to be as immune from credit risk as formerly. This is the result of their domestic lending practices, their foreign lending, the regional nature of some of the banks' operations, and macro-economic uncertainties.

During the latter half of the 1970's Canadian businesses turned increasingly to the chartered banks for financing. The banks' business loans increased from $5.2 billion in 1978 to $32.1 billion in 1981. Over the same period the share of business financing originating from the chartered banks increased from 31.7 percent to 78.2 percent. Insofar as bank borrowing was used as a substitute for equity, the business sector's debt/equity ratios reached historically high levels. When interest rates increased and economic conditions deteriorated, corporations experienced debt management problems which adversely affected the quality of the banks' asset portfolios.

Aside from the overall increase in the banks' lending to business, the banks also increased the size of individual loans, especially those extended to businesses to facilitate take-overs in the oil and gas industry. The Inspector General of Banks, in testimony to the House of Commons Standing Committe on Finance Trade and Economic Affairs (Bank Profits, 1982:99) revealed that there were four loans outstanding that exceeded $500 million to a single borrower and 15 loans exceeding $500 million to connected companies with closely related risks. He observed that such large loans created "fragility within the banking system" and that he "became concerned that the system was running ahead of what [he] considered to be prudential limits" (Canada, House of Commons, Issue 84, May 1982). He also indicated that he had informed the banks that their total loans

to any one borrower should not exceed 50 percent of a bank's shareholders' equity and preferred shares. In some cases, the amount of these loans had approximated 75 percent to 100 percent of the lending bank's capital. The major banks subsequently reassessed their internal guidelines and announced that they were restricting the maximum of their loans to a single borrower to 15 percent and to associated borrowers to 25 percent of their total capital. The House of Commons Committee on Finance Trade and Economic Affairs recommended in 1982 that the size of loans to any one borrower or associated group of borrowers should not exceed 25 percent of a bank's total capital unless approved by the Inspector General of Banks[1]. (Bank Profits, 1982:99)

Restricting the total amount of a bank's loans to a single borrower and associated borrowers to a specified proportion of its capital base encourages loan syndication which spreads risk among lenders. However, it may also shift more risk onto borrowers if a bank has less incentive to keep a borrower in financial difficulty afloat when it is a participating rather than a sole lender. While this makes individual bank loans risker, the overall risk of a bank's loan portfolio is reduced if as a result of loan syndication better diversification can be achieved.

During the 1970s, the banks also started to make more project loans. With this type of financing, the debt is serviced from the expected cash flow of the project itself and security is limited to the assets of the project.[2] Known as non-recourse lending, the banks have recourse against the project only and not against the sponsoring company. Large energy and real estate projects, whose success depended on higher prices, were financed with bank loans under the assumption that inflation would continue into the future. However, with recession in the early 1980s, the anticipated cash flows to be generated by many of these projects did not materialize, and the banks' loans either went into

default or had to be restructured. The banks suffered similar difficulties with their so-called production loans which were to be serviced by oil and gas reserves that were expected to be produced. In effect, the banks had become important market intermediaries which exposed them to risks not usually associated with their traditional function of financial intermediation.

The major Canadian banks, because of their size and the national scope of their operations, have little difficulty in reducing the average risk of their loan portfolios by diversifying them by type of loan and sector of industry. This was also made easier following the last two revisions of the Bank Act which provided them with the opportunity to expand their personal and residential mortgage lending activity.[3]

The more recently chartered and smaller Canadian banks, particularly those with a regional concentration, have experienced difficulties due to their inability to appropriately diversify their portfolios. Inappropriate portfolio diversification resulted in difficulties experience by the Bank of British Columbia, the Canadian Commercial Bank and the Northland Bank following the sustained downturns in the economies of British Columbia and Alberta after 1981.

The Canadian banks exposure to credit risks have also increased as a result of their expanded international operations. (See Wright, 1983). By 1980 some 41 percent of their asset portfolios were denominated in foreign currencies[4]. Credit risks can be higher in foreign than in domestic lending because of the difficulty and cost of acquiring information on the credit worthiness of borrowers. In addition, to the usual credit risks associated with domestic loans, foreign loans expose the banks to so-called country risks. These include the risks of political and social upheaval, nationalization or expropriation, government repudiation of external debts or foreign exchange

control in a country where the banks have loans outstanding. An important part of country risk is now referred to as sovereign risk which is the result of claims against foreign governments and their agencies and enterprises.

The Canadian banks increased credit risk exposure is reflected both in their loan loss experience and in the amount of non-performing loans.[5] The loan loss provision in any one year is included as an expense in a bank's Consolidated Statement of Income and in turn is added to its Appropriations for Contingencies in its consolidated balance sheet. The amount of each year's provision for loan losses is calculated by applying a five-year moving weighted average ratio of loss experience on loans to outstanding eligible loans at year-end. The method of calculation and the definition of eligible loans are prescribed in rules issued by the Minister of Finance.[6] A bank's actual loan losses in any one year are deducted from its accumulated appropriations for contingencies which are part of its capital base. Hence, in any one year when the actual amount of loss experience is larger than the loan loss provision, a bank's capital is reduced by the difference. As is shown in the table 1, in six of the last seven years the actual loan loss experience of the Canadian banks has exceeded their loan loss provisions. In 1983 the total loan loss experience was equal to 23.48 percent of their shareholders' equity, which by historical standards was exceptionally high. Had it not been for federal government assistance to major bank borrowers such as Dome, Massey-Ferguson, Maislin and the Atlantic fishing industry, their loan loss in recent years probably would have been substantially higher.

The actual loan loss experience has also been high relative to the coverage provided by the banks' net income before the provision for income taxes. As is shown in the table, this coverage was 4 times in 1978, and negative in each of the three years after 1981.

TABLE 1

LOAN LOSS: CANADIAN-OWNED CHARTERED BANKS

($ MILLIONS)

(1) Year End. October 31	(2) Loan Loss Provision	(3) Actual Loans Loss Experience	(4) Shareholders' Equity	(5) Actual Loan loss as a percent of Equity %	(6) Net Income before Taxes	(7) Loan loss as percent of net income %
1978	382.6	383.9	5,672.0	6.77	1,582.9	24.25
1979	486.3	437.0	6,848.1	6.38	1,443.0	30.28
1980	624.7	787.2	8,039.6	9.79	1,561.1	50.42
1981	864.6	934.8	10,105.9	9.25	2,229.4	41.93
1982	1,397.5	2,448.4	11,257.6	21.75	1,630.1	150.2
1983	1,710.6	2,939.1	12,513.0	23.48	2,772.5	106.0
1984	2,003.2	2,473.5	14,976.5	16.51	2,423.2	102.1

Source: Bank of Canada Review, April 1985

As is shown in Table 2, a large proportion of the banks actual loan loss has been on account of their foreign loans. In the last three fiscal years the international loan loss of the six largest Canadian banks was 39.4 percent of their total loss. At the end of their 1984 fiscal year their loans to Latin American countries alone amounted to some $20 billion which was the equivalent of over 150 percent of their primary capital. The Inspector General of Banks has suggested to the banks that they set up over their 1985 and 1986 fiscal years reserves equal to between 10 and 15 percent of their total exposure to 32 designated countries experiencing debt-repayment difficulties. Before the request was made, the banks generally had set aside reserves equal to between two and four percent of their exposure to these countries. The banks are now also required to disclose to the Inspector General of Banks their exposure to any one country which is greater than one percent of their assets.[7]

Deterioration in the quality of the banks' asset portfolios is also indicated by increases in their non-accrual loans, formerly referred to as non-performing loans. Loans are identified as non-accrual when interest has not been paid for more than 90 days or where in the opinion of a bank's management, there is doubt as to the collectibility of principal and interest. When loans are placed on a non-accrual basis, unpaid interest previously accrued is reversed and charged against current earnings. Should interest be received while repayment of principal is in doubt, it is usually applied toward reducing loan principal outstanding.

The amount of non-accrual loans as reported by most of the banks in their Annual Report is shown in table 3. The significant increases in domestic non-accrual loans after 1981 reflects cash flow difficulties of corporate borrowers in the gas and oil, commercial real estate and forestry sectors in Alberta and British Columbia. As with their loan loss experience, the amount of

TABLE 2

LOAN LOSS, INDIVIDUAL CANADIAN BANKS
(As of October 31, $ millions)

	1980	1981	1982	1983	1984
The Royal Bank of Canada					
Domestic	91	144	530	454	380
International	147	219	680	772	742
Total	238	363	1,210	1,226	1,122
Percent of eligible loans	0.35	0.36	1.00	1.18	1.11
Canadian Imperial Bank of Commerce					
Domestic	217	151	428	496	314
International	5	17	60	226	186
Total	222	168	488	722	500
Percent of eligible loans	0.60	0.34	0.87	1.36	0.92
The Toronto-Dominion Bank					
Domestic	41	56	150	220	175
International	3	29	48	68	117
Total	44	85	198	288	292
Percent of eligible loans	0.19	0.25	0.56	0.84	0.79
The Bank of Nova Scotia					
Domestic	68	98	224	298	181
International	5	-	89	62	104
Total	73	98	313	360	285
Percent of total loans	0.26	0.28	0.84	0.96	0.71
Bank of Montreal					
Domestic	127	181	360	373	155
International	27	87	190	178	210
Total	154	268	550	551	365
Percent of eligible loans	0.46	0.60	1.13	1.19	0.68
National Bank of Canada					
Domestic	121	59	98	77	48
International	-	-	20	43	68
Total	121	59	117	120	116
Percent of eligible loans	1.28	0.51	0.89	1.02	0.91
Continental Bank of Canada					
Total	10.7	9.52	29.78	32.13	26.50
Percent of eligible loans	0.41	0.33	0.86	0.80	0.57
Mercantile Bank of Canada					
Total	6.2	16.8	30.6	23.8	31.4
Percent of eligible loans	0.20	0.53	0.85	0.68	0.78
Bank of British Columbia					
Total				51.3	85.4
Percent of eligible loans				2.16	3.24

Source: 1984 Annual Reports of the respective banks.

TABLE 3

NON ACCRUAL LOANS(1) CANADIAN OWNED BANKS
As of October 31, $ millions)

	1980	1981	1982	1983	1984
The Royal Bank of Canada					
Domestic	171	216	1,252	1,632	1,407
Foreign	33	12	788	1,206	1,276
Total	204	228	2,040	2,838	2,683
Percent of total loans	0.50	0.40	3.38	4.89	4.55
Canadian Imperial Bank of Commerce					
Domestic	236	392	1,113	1,715	1,415
Foreign	2	1	103	169	381
Total	238	393	1,216	1,884	1,796
Percent of total loans	0.65	0.80	2.27	3.84	3.52
The Toronto-Dominion Bank					
Domestic	109	185	733	1,025	962
Foreign	150	99	312	338	380
Total	259	284	1,045	1,363	1,342
Percent of total loans	1.15	0.87	3.21	4.42	3.99
The Bank of Nova Scotia					
Domestic				1,048	752
Foreign				327	411
Total	N/A	N/A	N/A	1,375	1,163
Percent of total loans				3.87	3.04
Bank of Montreal					
Domestic			687	736	640
Foreign			437	526	784
Total	N/A	N/A	1,124	1,262	1,424
Percent of total loans			2.55	3.04	2.97
National Bank of Canada					
Domestic				174	169
Foreign				42	53
Total	N/A	N/A	N/A	216	222
Percent of total loans				1.63	1.48
Continental Bank of Canada					
Domestic		22	77	78	70
Foreign		-	-	-	-
Total	N/A	22	77	78	70
Percent of total loans		0.72	2.25	2.02	1.56
Mercantile Bank of Canada					
Total	25	14	216	266	208
Percent of total loans	0.90	0.48	6.60	8.29	5.55
Bank of British Columbia					
Total				88.5	59.5
Percent of total loans				3.72	2.39

(1) After deductions for specific provisions for losses.

Source: 1984 Annual Report of the respective banks.

the banks non-accrual loans probably would have been higher had it not been for government assisted "bailouts" of some of the banks' larger borrowers and bank assisted corporate debt restructuring agreements. In some cases, loans that could not be repaid were replaced on the banks balance sheets with corporate preferred and common shares.

The amount of non-accrual foreign loans, in particular, would have been substantially higher had it not been for debt rescheduling arrangements by the international banking community for countries in economic distress. Some non-accrual loans were made current with additional loans extended by the banks to allow borrowers to meet their payments on existing loans. In other instances, the banks allowed debtors to capitalize overdue interest. Both methods for dealing with non-accrual loans adversely affected the quality of the banks' foreign loan portfolios which prompted the Inspector General of Banks' to request additional reserves against these loans.

The evidence that is available suggests that during the period of rapid business loan expansion after the mid-1970's, the Canadian chartered banks lending strategies accepted higher credit risk exposure both in terms of the quality of individual loans and the degree of portfolio diversification. Their credit risk exposure also increased as their term loans were replaced with variable rate loans which had the effect of substituting interest-rate risk for credit risk. In addition, the credit risks assumed by some institutions were primarily the result of mismanagement. The latter two reasons explaining the higher credit risk exposure are considered separately below.

Legislation requires that Trust and Mortgage loan companies hold the predominant proportion of their assets in loans secured by real estate. Moreover a mortgage loan may not exceed 75 percent of the value of the underlying real estate, unless the excess is appropriately insured. Hence the

credit risk of these companies depends upon the market value of real properties when loans have to be foreclosed and the ability of the borrower to repay.

As early as 1935 under the Dominion Housing Act, in 1937 under the Home Improvement Loans Guarantee Act, and with the National Housing Act and the establishment of the Canada Mortgage and Housing Corporation, the federal government shared the risks of residential mortgage loans. However, its risks on insured residential mortgages have been controlled by construction quality standards and in the case of owner-occupied housing by gross debt service to income ratios. In effect, mortgage insurance has insulated from default risk the institutions' residential mortgage loans extended under the National Housing Act.

Conventional residential mortgage loans, which are usually second or lower ranking, are not insulated from risk by government insurance but may be covered by private insurers. These loans constitute 42 percent of trust and loan companies asset portfolios. For most companies residential mortgage loans have not been a major source of increase in their credit risk exposure. The exception has been companies in Western Canada who experienced an increase in foreclosures following a large decline in real estate values after 1981 in Alberta and British Columbia.

Excessive credit risk associated with commercial mortgage lending explain the higher recent incidence of failure among trust and mortgage loan companies. In most cases of failure, excessive credit risk has been related to mismanagement and self dealing. Loans were made based on unrealistic and in some instances fraudulent property values. In other instances, the expected income from property development and construction being financed fell far short of what was required to service mortgage loans and to meet administrative costs.

Furthermore, ever increasing complexity was added to loan contracts to circumscribe prudent lending practices and at times to escape the attention of regulators.

(ii) Interest Rate Risk

Before the mid-1960's when the yield curve of the structure of interest rates remained stable and positively sloped, and the financial institutions could depend almost entirely on growth in their stable retail deposit base to fund their assets, their major risk was credit risk which they could control with appropriate asset management techniques. After 1967, with the removal of the legislated six percent ceiling on their loans, and later with the introduction of foreign banks and new domestic banks, competition for deposits, particularly at the wholesale level, intensified. The major Canadian chartered banks gained their first experience in competing for wholesale deposits when they expanded their operations into foreign markets during the 1960's. The growing reliance on wholesale rather than retail deposits introduced funding risks which the institutions controlled with requisite liability management. In the mid-1970's, with higher levels and volatility of interest rates, and in particular sudden reversals in the slope of the interest rate yield curve,depository institutions became subject to interest rate risk, commonly referred to as mismatch risk. To control these risks asset-liability management was developed.

Interest rate risk has two components: income risk and investment risk. Income risk is the risk of loss in net interest income as a result of unsynchronized movements in an institution's borrowing and lending rates. Investment risk is the risk of loss in net worth due to interest rate changes. Net worth is the difference in the market values of assets and nonequity liabilities.

To facilitate control of interest rate risk, two measures have been developed - "gap" and "duration gap" - to identify an institution's exposure to interest rate risk[8]. These measures, in turn, can be used to develop appropriate asset-liability strategies for controlling interest rate risk.

Gap management can be used to insulate net interest income from unexpected changes in market interest rates. A gap is defined in terms of rate-sensitive assets (RSA) and rate sensitive liabilities (RSL) and expressed either as dollars or as a percentage of total earning assets. Assets and liabilities that mature or can be repriced within a year are usually considered as being rate sensitive or variable. When RSA > RSL, a positive dollar gap is said to exist which exposes an institution's net interest income to unexpected decline in interest rates[9]. Alternatively, when RSA < RSL, a negative gap exists which exposes an institution to a rise in interest rates. For example, when interest rates rise unexpectedly, as rate-sensitive liabilities mature or are repriced, they are replaced with liabilities at the higher rates, thus increasing the institution's interest expense and reducing its net interest income. But as rate-sensitive assets mature or are repriced, they are replaced with assets that earn the higher rates, thus increasing the institution's net interest income. With an initial negative gap, and an unexpected increase of interest rates, net interest income declines because the income-reducing effects are larger than the income-increasing effects. Alternatively, with an initial positive gap, an increase in interest rates enhances net interest income. On the other hand, with an initial gap of zero, the income-reducing effects approximately offset the income-increasing effects, leaving net interest income more or less unchanged.

The degree to which a zero gap insulates an institution's net-interest income from unexpected interest rate fluctuations depends upon the extent to

which interest rates on assets and liabilities move together over the gapping period. The longer this period, the greater the probability that unequal changes will occur. For example, suppose the gapping period is one year and all rate sensitive assets are repriced on day 1, while all rate-sensitive liabilities are repriced on the last day of the year. If RSA = RSL, the gap measurement would show incorrectly that the institution is hedged against unexpected changes in market interest rates. To overcome this difficulty, more sophisticated techniques have been developed that define incremental gaps for non-overlapping subperiods of longer specified planning periods (see Toevs (1983)). For instance, balance sheet items can be grouped into a number of maturity "buckets" such as one to three months, three to six months, six to nine months and so on. Incremental gaps are then computed for each maturity bucket.

Another draw back with the basic gap technique is that it assumes interest rate changes for assets and liabilities of all maturities are of the same magnitude. This difficulty in handled by the so called "standardized gap" which adjusts for the relative volatilities of various financial instruments. For example, using historical interest rate change data on various rate-sensitive assets and liabilities, interest rate change proportionalities can be estimated. These proportional factors measure the rate volatility of the various financial instruments of different maturities.

The large depository institutions now use gap analysis to monitor and manage their risk exposure and some of them disclose in their annual reports their interest sensitivity gap. For example, the Toronto-Dominion Bank reported a positive gap for interest sensitive assets and liabilities within one year of $270 million or 0.7 percent of its assets at the end of October 1983. At the end of its following fiscal year, this gap was negative and amounted to $200 million or 0.5 percent of total assets. The positive gap at the end of its 1983

fiscal year exposed its net income to a decline in interest rates whereas the negative gap at the end of its following fiscal year exposed its net income to an unanticipated increase in interest rates. The National Bank of Canada reduced its gap as a percent of total assets from 5 percent as of October 1982 to 1.6 percent in 1983 and 0.8 percent at year end 1984. The Canadian Imperial Bank of Commerce had a positive gap as at its 1984 fiscal year end of $3.5 billion or 5 percent of its total assets.

While gap management can be used to insulate an institution from the income risk compoment of interest rate risk, it provides no insulation from the investment risk component. For this purpose, duration gap management has been developed. It measures interest rate risk resulting from the effect of changes in interest rates on the present values of cash flows and periodic principal payments of assets and liabilities. Duration is defined as the period of time that elapses until a financial instrument earns its average payment, in present value terms[10]. For instance, consider a $1000, 10-percent three year bond. The institution holding this bond expects to receive $100 at the end of each of the first two years and $1100 (principal plus interest) at the end of the third year. The bond's duration is 2.7 years because theoretically the institution receives its average payment in 2.7 years[11]. Duration of a stream of positive payments is always less than the time until the last payment or maturity, unless the instrument is a zero-coupon bond, in which case duration is equal to maturity.

Duration can be used to calculate the interest sensitivity of an institution's net worth given the following relationship between interest rate change, the price change of a financial instrument and duration:[12]

$$\begin{pmatrix}\text{percentage change in}\\ \text{financial instrument}\\ \text{price}\end{pmatrix} = -\text{duration} \times \begin{pmatrix}\text{unexpected}\\ \text{interest rate}\\ \text{change}\end{pmatrix}$$

The percentage change in the price of an instrument is equal to the negative of duration multiplied by the unexpected interest rate change. The greater a financial instrument's duration, the larger the impact of a given change in interest rates on the instrument's price.

Duration gap is the difference between the duration of an institution's assets and the duration of its liabilities[13]. If the duration gap is zero, an unexpected interest rate movement changes the market value of assets and liabilities by about the same amount and leaves its net worth essentially unchanged. Interest rate sensitivity of an institution's net worth increases with increases in the difference between its asset and liability durations. For example, if an institution holds assets with relatively short durations and liabilities with relatively long durations, an unexpected interest rate decline causes a slight rise in the market value of its assets but a large decline in the market value of its liabilities causing net worth to decline.

If an institution maintains a zero gap it may have a nonzero duration gap and if it maintains a zero duration gap it may have a nonzero gap. If it prefers a steady income for its stockholders it will emphasize gap management to control income risk. On the other hand, if it prefers maintaining the value of its shares, it will put more emphasis on duration gap management to control investment risk.

While the Canadian depository institutions have been faced with higher interest rate risks, and in some cases the consequence of these risks has played an important role in explaining their insolvency, by and large they have been much more successful than their American counterparts in managing these risks because they have been free of interest rate ceilings on their deposits.

The Canadian depository institutions' asset and liability mismatch first appeared after the mid-1970's when with higher and more volatile interest rates, together with inflationary expectations, savers demanded shorter term

deposits. This created particular difficulties for the trust and mortage loan companies, with a large proportion of their asset portfolios consisting of longer-term fixed rate mortgage loans. They attempted to relieve their mismatch over time by introducing variable rate mortgages and to the extent possible within their regulatory constraints by expanding their short-term consumer and commercial lending activities. Some companies which followed a strategy of rapidly expanding their portfolios with the addition of higher yielding mortgage loans, because of competitive pressures were forced to take higher ranking mortgages of dubious quality. In effect, these companies replaced their mismatch risk with credit risk. The mismatch of assets and liabilities, and their strategies to resolve their consequent difficulties, were important contributing factors to the failures of Fidelity Trust, Seaway Trust and Western Capital Trust.

Interest rate risks and the difficulty in managing them, also explainsfailures among ..any credit unions and caisses populaires. While the chartered banks have been faced with similar difficulties, because the interest rates charged on their loans are usually tied to their prime rates, repricing has been somewhat easier. Moreover, some of the larger banks have attempted to manage their interest rate risks with new types of financial instruments such as interest rate futures, swaps, and call and put options.

To the extent that repricing profiles of the depository institutions loans and deposits are matched, their exposure of net interest income to interest rate risk is reduced. But, a fully-matched position, while eliminating interest rate risk, also limits their profit potential. Hence these institutions must constantly weigh opportunities for enhanced returns arising from mismatched positions and favorable interest rates movements against the costs that could arise from unfavourable interest rate changes. Furthermore,

restructuring which introduces more rate sensitive assets to match rate sensitive liabilities, substitutes credit risk for interest rate risk by shifting interest rate risk to borrowers[14]. The increased interest rate exposure shifted to the institutions' borrowers created difficulties for both the borrowers and the lenders in 1981 when interest rates increased at the same time that economic recession adversely affected the cash flows of borrowers.

When the depository institutions' assets and liabilities cannot be restructured to achieve a zero gap or a zero duration gap, or when institutions follow a strategy to maintain either positive or negative gaps, financial futures can be used to hedge interest rate risk.[15] A financial futures contract is an agreement between two parties to sell a financial instrument at some future date at a price agreed upon now but paid in the future at the time of delivery. By agreeing on a price in advance, both parties to a financial futures contract wager a bet on interest rate movements between the agreed date and the delivery date. Financial futures can insulate or immunize an institution from interest rate changes by offsetting a potential loss (gain) of net interest income or net worth with a potential gain (loss) from futures trading.

Hedging cannot remove completely an institution's risk of interest rate volatility because "basis risk" is substituted for interest rate risk. ("basis" is the price (or yield) difference between a futures contract and the financial instrument on which the contract is based.) Basis risk is generally smaller and more predictable than interest rate risk.

While financial futures provide opportunities for institutions to reduce their exposure to interest rate risk, under certain conditions the use of such contracts can also increase exposure, and in the extreme case jeopardize an institution's solvency. For example, an increase in exposure could occur if an

institution's assets and liabilities were affected equally by changes in market interest rates. In this case portfolios would be hedged already, and taking a position with futures would serve only to establish a new unhedged position. The use of futures can also create cash flow problems when institutions experience cash losses in future positions and are required to meet margin calls. In order to insure that institutions enter futures markets as hedgers rather than speculators, and that appropriate management and accounting procedures are followed, in the United States the Comptroller of the Currency, the Federal Deposit Insurance Corporation and the Federal Reserve Board have issued trading guidelines to financial institutions under their jurisdiction. (See Morris, 1984)

In Canada, depository institutions have only started to use financial futures to hedge their interest rate exposure. Greater use of this technique probably awaits the development of more mature financial futures markets.

(iii) Funding Risk

Funding risk is associated with an institution's ability to acquire and retain the requisite amount of deposits to fund (finance) its assets. Historically, soundness of the Canadian chartered banks was characterized by their stable base of domestic retail deposits collected through their extensive nation-wide branch networks from a wide cross-section of individuals, corporations and institutions. Moreover, as a cushion to cover not only expected withdrawals and adverse clearings but also unexpected deposit drains, they maintaimaintained relatively high liquid asset ratios. The larger banks still enjoy a stable base of domestic retail deposits, but have allowed their liquid asset ratios to decline. The liquid asset ratio of all the Canadian banks which was on average 21.7 percent during the decade of the 1970's fell to an annual average of 11.6 percent and in 1982 to a low of 9.3 percent[16]. At the same time their

wholesale deposits, or purchased funds, increased from some 20 to 30 percent of their total Canadian dollar deposits. These data suggest that the banks have turned to liability sources for liquidity. Their foreign currency assets are almost entirely funded with wholesale deposits. Such funding is not only uncertain, but at times also expensive. The banks have attempted to control their funding risks with a greater diversification among depositors and by tying the terms of their loans to those of the deposits which fund them.

Funding risks can affect an institution's solvency in two ways: indirectly where the terms of its assets are not tied to the costs of deposits and a sharp and prolonged increase in the level of interest rates reduces its net income; directly where the withdrawl of deposits requires it to reduce its assets and capital base.

As interest rate levels increased and became more volatile, funding risks of the newer established chartered banks and most of the trust and mortgage loan companies increased. Without a nationally established network of branches and offices, these institutions have to rely on purchased liabilities to fund their asset growth. Many of them use agents or brokers, who receive a fee or commission, to solicit deposits for them. The existence of deposit insurance, and public perception that governments guarantee the safety of deposits and other liabilities not covered by insurance, has made it easier for these institutions to "sell" their liabilities and probably has encouraged them to do so.

An institution's funding risk may increase as a result of an increase in its own exposure to other risks, or as a result of an increase in risk exposure by other depository institutions causing a loss of confidence in its soundness. The latter is referred to as the "contagion effect" where a sound institution is subject to a withdrawal of funds because of a flight of deposits

from institutions with perceived or actual difficulties. For example, in 1985, the increase in the Northland Bank's funding risk was closely related to the financial difficulties experienced bythe Pioneer Trust and the Canadian Commercial Bank. To the extent that financial institutions are purchasing more of each others liabilities, the depository system's vulnerability to the contagion effect also is larger.

In the short run a depository institution's exposure to funding risk is covered by the availability of Bank of Canada advances. Traditionally, these secured advances have not been considered a continuing source of funds and have only been available on a last resort and temporary basis to allow the banks to adjust their cash reserve or liquidity positions. However, in 1985 to prevent longer term and more serious liquidity problems of the Canadian Commercial Bank from spilling over into financial markets, the Bank of Canada extended advances to the troubled bank over a six months period. Without these advances, which in effect replaced deposit withdrawals, the bank would have become insolvent as eventually was the case when the central bank removed its support.

The large and extended advances provided by the Bank of Canada to the Canadian Commercial Bank were similar to the "extended credit" program of the Federal Reserve System in the United States (see Board of Governors of the Federal Reserve System, 1984). In addition to the usual central bank adjustment credit, the Federal Reserve System provides "seasonal extended credit" and "other extended credit". The latter includes needed interim financing to allow the borrowing institution to restructure its loan portfolio, or replace current management, or to allow regulators to merge or close the institution.

The Canada Deposit Insurance Corporation (CDIC) also extends secured loans and advances to depository institutions for liquidity purposes. The availability of lender of last resort facilities from both the CDIC and the Bank

of Canada on an extended basis provides an incentive for depository institutions to pay less attention to their liquidity requirements and to increase their exposure to funding risk.

(iv) Contingent Liability Risk

In the normal course of their business, depository institutions, especially the larger banks, undertake commitments and have contingent liabilities. These include commitments to extend credit, loan guarantees, letters of credit, forward exchange contracts, interest rate and currency swaps, financial futures, option contracts, note issuance facilities (NIFS) and revolving underwriting facilities (RUFS) (See Goldberg, Altman and Farash (1983)). The banks report only the amount of their loan guarantees and letters of credit and only in a footnote to their annual statements. Hence the total extent of their contingent liability risk is unknown.

The banks reported contingent liabilities in 1984 are shown in table 4. The five largest banks had an average contingent liabilities equal to 5.4 percent of their assets. Of the ten banks shown in the table, only three had capital and reserves sufficient to completely cover their contingent liabilities. The contingent liabilities reported by the Canadian Imperial Bank of Commerce, for example, amounted to 152.5 percent of its capital and reserves.

Commitments to extend credit, that is unused lines of credit, can increase an institution's funding risk and under certain circumstances also its credit risk. For example, an institution's credit risk exposure may increase if the credit worthiness of customers with unused lines of credit is not regularly monitored by it.

Bank guarantees with respect corporate preferred share issues became a concern of the Inspector General in 1984.[17] So called bank-backed preferred

TABLE 4

CANADIAN CHARTERED BANKS
REPORTED CONTINGENT LIABILITIES
(As of Oct 31, 1984; millions of dollars)

Bank*	Guarantees	Letters of credit	Total	Percent of Assets	Percent of capital and Reserves
Canadian Imperial Bank of Commerce	2,486	1,946	4,432	6.5	152.5
Royal Bank of Canada	2,808	1,592	4,400	5.0	117.6
Bank of Montreal	1,571	1,772	3,343	4.4	140.0
Toronto-Dominion Bank	1,682	1,323	3,005	6.4	126.5
Bank of Nova Scotia	1,585	2,272	2,665	4.5	116.9
National Bank of Canada	389	321	710	3.7	75.6
Mercantile Bank of Canada	135	107	242	5.0	114.2
Bank of British Columbia	62	20	82	2.7	109.3
Continental Bank of Canada	71	25	96	1.7	82.1
Canadian Commercial Bank			71	2.3	29.2

* not reported: Bank of Alberta, Morguard Bank of Canada, Northland Bank and Western and Pacific Bank of Canada whose contingent abilities represent less than one percent of their assets.

Source: Annual Report, 1984, various banks.

shares expose a bank to additional risk because it guarantees any unpaid dividends or redemption amounts.

The extent to which the banks have increased their risk exposure in facilitating corporate and government international security issues is unknown. With "RUFS" a bank provides back-up lines of credit for short-term international security issues which requires it to extend loans if borrowers cannot resell their short-term paper on maturity; and with "NIFS" it is obliged to take up the issue.

By increasing the amount of their off-balance sheet liabilities, the institutions have been able to increase their income without adding to their assets. This has a particular attraction for institutions who have high capital leverage ratios. However, it exposes their depositors and creditors to additional risk when the underlying risks are not appropriately priced by the institutions. This is usually the result of an inherent difficulty in evaluating the related contingency risks.

(v) Management Risk

In the final analysis, the risk to a depository institution's solvency stems from its management's (1) inability to recognize excessive risks, (2) its inability to manage excessive risks or (3) its propensity to assume excessive risk. Management's inability to recognize excessive risk, that is an amount of risk that threatens an institution's solvency, may be the result of ineptness because of unfamiliarity with inherent fragility of depository institutions or sudden and unanticipated reversals in macroeconomic conditions as a result of government policy initiatives rather than market forces. Given the inflationary climate and the oil surpluses enjoyed by the oil producing countries, little risk was attached to sovereign loans and loans to the energy sector during the 1970's. Many of these loans became risky only after monetary policy initiatives

in the industrial countries not only succeeded in halting the inflationary spiral but also severely dampened economic growth. When financial institutions became victims of unanticipated reversals in government policies many of them were unable to manage their excessive risks due to their inexperience, size and in some cases regulatory contraints.

In comparison to American experience, Canadian depository institutions have been more successful in coping with macroeconomic changes. This has been the result of the absence of ceilings on deposit interest rates in Canada, and the existence of sufficient regulatory flexibility to allow diversification into non-traditional activities. For example, the trust and mortgage loan companies, and to a lesser extent the caisses populaires and credit unions, have expoiting their unused statutory powers to increase their commercial lending activities. The Canadian institutions were also able to better weather perversity in the international macroeconomic environment because those that had greatly expanded their foreign operations were sufficiently large to absorb unanticipated losses without disastrous effects on their solvency.

Most of the depository institutions insolvencies or near insolvencies in recent years, both in Canada and the United States can be traced to an increased propensity by these institutions starting in the 1970's toward risk taking. In retrospect, their additional risk exposure would have been excessive even without the subsequent turn in macroeconomic variables.

Most of the reasons explaining the higher propensity to assume excessive risk fall under the rubric of mismanagement. The incidence of mismanagement has increased because of an erosion of market discipline and because of regulatory laxity.

It is now generally assumed that a major cause of the erosion of market discipline has been government deposit insurance. An extensive

literature exists on the impact of deposit insurance on risk decisions. (For example, Bentson (1983), Buser, Chen and Kane (1981), Clair (1984) Kane (1985), Flannery (1982), Kareken (1983), Kareken and Wallace (1978), Short and O'Driscoll (1983)).

With government deposit insurance, and more recently government guarantees to uninsured depositors, depositors perceive little or no need to concern themselves with the soundness of the institution in which they have placed their deposits. At the same time institutions can attract funds at a rate commensurate with depositors perception of their riskless status. This allows institutions to invest in risky assets and to engage in risky activities without bearing the costs of such risks. In case of insolvency these costs are borne by the deposit insurer or directly by government under guarantee or "bail out" arrangements.

Moral hazard problems associated with insurance contracts are well known in the insurance industry which has learned to cope with changes in behaviour when insurance is introduced. Economists have analysed moral hazard problems in terms of the theory of contracts, principal-agent relationships and information theory.[18] With imperfect information or asymetric information, depository institutions are able to conceal activities, that may adversely affect their solvency, from their regulators, the deposit insurer, and their depositors and other creditors. This provides them with the incentive to undertake riskier activities that promise higher returns to their shareholders.[19] This incentive is reinforced by deposit insurance with uniform or flat-rate insurance premiums. Under such a system institutions with a high risk exposure not only are not charged insurance premiums that reflect their higher exposures, but also are subsidized by institutions with lower risk exposures. Furthermore, if the public perceives that the safety of its deposits

is assured by the deposit insurer, institutions will experience little or no difficulty to fund their riskier activities. Regardless of the risks involved, depositors will have the incentive to place their funds with institutions that pay the highest interest rates. Moreover, competitive pressures may force prudently managed institutions to undertake riskier activities in order to match the higher deposit rates offered by their less risk averse rivals.

Postmortems of trust and mortgage companies and bank failures indicate a high incidence of moral hazard problems among financial institutions that were narrowly held. Table 5 reproduces the summary by James Morrison of mismanagement in five institutions, all narrowly held, that failed in Ontario in 1983. A similar list of management deficiencies explain the failure of the Canadian Commercial Bank in 1985[20]. In all these failures, a common theme is the assumption of excessive risk due to self-dealing, that is, non-arms length transactions between a financial institution and its major shareholders, directors, senior officers and close associates. Many of the self-dealing abuses have involved extremely complex and innovative arrangements which have made it difficult for auditors and regulators to identify. Others include real estate and mortgage transactions at artificial prices with closely associated shareholders and affiliates, the purchase of assets from shareholders at prices that do not reflect market values, and large loans to senior officers, shareholders and their close associates. Postmortems of narrowly held trust and mortgage companies that failed suggest that their shareholders acquired control of these institutions as a vehicle for financing their associated real estate development and construction companies and other speculative enterprises. In the case of the failure of the Canadian Commercial Bank, imprudent management practices included the moving of "bad" loans to new names and showing them as "good", collecting past due interest on a loan and providing for future interest

TABLE 5

Summary of Significant Deficiencies in Operations Noted by Touche Ross Limited with Respect to the Greymac and Seaway Companies and by Woods Gordon with Respect to Crown Trust

	Greymac Trust	Seaway Trust	Greymac Mortgage	Seaway Mortgage	Crown Trust[1]
Books and records incomplete and not current	X	X	X	X	
Management lacking in depth and competence	X	X		X	
Accounting records do not permit adequate control of business	X	X		X	
Files lack information resulting in poor lending practices	X	X	X		X
Transactions of unusual complexity and involving rapid value escalations	X	X	X	X	
Lack of compliance with various legal requirements	X	X	X	X	X
Transactions for benefit of senior officers	X	X	X	X	

(1) Crown Trust - Since control by Rosenberg (October 7, 1982)

Source: Report of the Special Examiner by James A. Morrison F.C.A. of Crown Trust Company, Greymore Trust Company, Seaway Trust Company, Greymore Mortgage Corporation and Seaway Mortgage Corporation to The Honorable Robert G. Elgie M.D., Minister of Consumer and Commercial Relations, Province of Onatario, June 30, 1983, p 110.

by increasing the amount of the loan outstanding and artificially increasing profits with fees collected from such imprudent loan restructuring[21].

(vi) Delivery Risk

In recent years depository and other financial institutions have added to their traditional activities and have changed the mode whereby services are provided to the public. (Binhammer and Williams (1976), Freedman (1983) and (1985)). This has exposed the institutions to additional risks which have been identified as "delivery" risks (Sinkey (1984)).

The metamorphosis in financial services production and delivery has been the result of technological improvements in the transmission, processing and storage of information. This has introduced technological risks which need to be monitored and managed. In order to remain cost competitive and to offer new services directly related to the new technology, the institutions have had to acquire equipment subject to uncertain costs of obsolescense.

The institutions have added to their traditional services provided to the public with the expectation of enjoying economies of scale and scope. The evidence that is available suggests that in most instances economies of scale are usually exhausted with relatively small size both in terms of assets and activities.(Benston, Hanweck and Humphrey (1982)) The existence of economies of scope, while less uncertain, the costs of their exploitation may exceed any expected returns. (Gilligan, Smirlock and Marshall, (1984)) Evidence of this may be the withdrawal of the banks from mutual funds, factoring and real estate investment trusts.

The desire to offer a broader range of financial services to the public has been accompanied by organizational or structural changes in the form of financial conglomerates or financial holding companies. U.S. experience suggests that depository institutions cannot be adequately insulated from the

risks assumed by other companies in a holding company structure. (See Eisenbeis (1983) and Wall (1984)) Beneficial synergistic or other relationship which might result from financial conglomeration implies the exercise of management, operational or other influence by the parent institution. This increases the risks of depository institutions because of the greater potential for self-dealing and abusive conflicts of interest.

Another way for a financial institutions to deliver a broader range of services to the public is through "networking". With networking a financial institution is the vendor of financial services produced by others. Where networking takes place among unaffiliated or otherwise unrelated companies, the vendor may be exposed to risk because of the loss of control over the quality of the products and the future terms and conditions under which he can offer them to the public. Contractual arrangements to avoid such delivery risks could introduce undesirable anticompetitive practices (Calem (1984)).

III INSTITUTIONAL INSOLVENCY AND CAPITAL ADEQUACY

(1) Insolvency and Closure

When is a depository institution insolvent and how soon should it be closed? These questions have relevance both for the maintenance of confidence in the depository institutional system and for the deposit insurer's risk exposure and ultimate cost.

A deposit institution is usually considered to be insolvent when (1) it can no longer pay its obligations as they fall due, that is, a negative cash flow cannot be met, or (2) the value of its liabilities exceed the realizable value of its assets, that is, its real net worth is negative.[22] As described below, the legislation applying to the banks provides a legal definition of insolvency centered on the first criterion. This reflects the time when the banks could, and did, suspend convertibility of their own notes into cash or gold. It also takes cognizance of their historical role in providing the country's medium of exchange in the form of demand and chequable deposits.

On the other hand, the legislation applying to trust and mortgage loan companies emphasises the net worth criterion which was probably considered more relevant for them when only a small proportion of their liabilities was in the form of deposits similar to the banks.

Determining when an institution's liabilities exceed the realizable value of its assets is subjective, particularly under book value accounting conventions. Short of closure and the sale of assets, there is no way objectively to determine the market or realizable value of an institution's loan and investment portfolio. Objectivity is further exacerbated by the lack of secondary markets for most of the loans held by these institutions. Given the uncertainties associated with asset valuation, the real net worth criterion

probably when used is biased toward closing an institution long after its networth (in market value terms) has become negative.[23] Such delay adds to the deposit insurer's cost of closure. On the other hand, if the probability of incorrect assessment of net worth is high, delay may be desirable where the cost of closure with respect to a loss in the confidence of the soundness of the depository system is high.

Even with appropriate asset valuation, there could be difficulties when using the net worth criterion of insolvency. An institution may have positive networth but be unable to meet its obligations as they fall due. This can occur when the time pattern for meeting obligations is shorter than that for the realization of assets. On the other hand, the time pattern for the realization of assets may be sufficiently short to allow an institution to continue to meet its obligations while already in a negative net worth position.

An inability to meet obligations as they fall due is a more objective criterion of insolvency. However, it too has its difficulties because of the uncertainty of knowing whether an institution's inability to meet contractual cash-flow obligations is due to illiquidity or insolvency. If it is a liquidity problem it can be dealt with by the lender-of-last resort facility of the Bank of Canada or the Canada Deposit Insurance Corporation. However, insolvency can be mistaken for illiquidity as was the case in 1985 with the Canadian Commercial Bank. This can prove very costly for the deposit insurer. Insolvency can be masked not only by lender-of-last resort assistance but also by deposit insurance which removes depositors' incentive to withdraw funds from an institution in danger of failing.

Another approach to defining insolvency is to relate the present value of an institution's <u>expected</u> cash flow over some appropriate period to the market value of its net worth. For example, an institution might be declared to

be insolvent if the present value of its expected cash flow, say over a five year period, is less than the current market value of its net worth. This approach focuses on an institution's potential viability as an ongoing concern and recognize the dynamic nature of the operations of depository institutions. However, its implementation requires a measurement system which may be very difficult to obtain both as a theoretical and practical matter.

Despite the legal definitions of insolvency stated in the legislation applying to depository institutions, the procedures that have to be followed before an institution can be closed allow the regulators and the court to explore the potential viability of an institution in determining its insolvency and closure.

The Bank Act states that "Any suspension by a bank in Bank of Canada notes of any of its liabilities as they accrue, if it continues for ninety days consecutively, constitutes the bank insolvent". (Part XI Section 276). The procedure, after this condition of insolvency is recognized, before ultimate closure can be protracted. After the Inspector General of Banks reports to the Minister of Finance that a bank can no longer pay its liabilities as they fall due, the Minister may appoint a curator to take over management of the bank's affairs. The curator may attempt to reorganize the bank's affairs or amalgamate it with another financial institution. Failing this, he will seek a court order under the Winding-up Act (R.S., c296s1) to liquidate the bank. This order cannot be issued before meetings of shareholders and creditors have been convened to "ascertain their respective wishes as to the appointment of a liquidator".[24] The Court may delay the appointment of a liquidator if it can be persuaded that the curator has not sufficiently explored all possibilities for reorganization or amalgamation.

Procedures for declaring legal insolvency and for closing a trust company and a mortgage loan company are set out in the federal Loans Company Act (R.S.,c 170s1) and similar provincial statutes. Under federal legislation, the Superintendent of Insurance is required to report to the Minister of Finance when an institution exceeds its authorized borrowing limit in terms of its capital; or its assets are less than its liabilities; or its assets are considered insufficient to give adequate protection to depositors, debenture holders and other creditors. The Minister, after considering the Superintendent's report and after giving the institution a chance to be heard, may take one or more of three courses of action. He may give the institution a period of time to correct violations and meet deficiencies; he may place limitations on its licence to operate; or he may direct the Superintendent of Insurance to take control of its assets. Subsequently, if matters are not rectified, the Minister may apply for a court order under the Winding-up Act to liquidate the institution or to have the Superintendent take control of the institution for its management and rehabilitation.

Under the present legislation the power to initiate liquidation proceedings rests with the regulators and their respective Ministers while the power to order closure rests with the Court. Without the insurance liability of the CDIC their concern for the viability of an institution will tend to keep it open longer than may be optimal from the insurer's point of view. The CDIC does not have the legal authority to require an institution to be wound-up or to be liquidated nor can it become, if it so chooses, the liquidator of an insolvent institution. The Wyman Committee (Final Report of the Working Committee on the Canada Deposit Insurance Corporation, (1985)) would give such powers to the CDIC. Since closure of a depository institution usually involves externalities beyond the costs that have to be borne by the CDIC, ordering liquidation

probably should remain the sole prerogative of the Court. However, where the Court orders liquidation proceedings the CDIC should be given the power to act as liquidator with the authority to close the institution in a manner that will minimize its own liability and is least disruptive to the financial system.

The manner in which the CDIC should proceed in closing an institution to reduce the cost to it is not clear. In the past it has used one of two methods: immediate liquidation or wind-down under agency and administrative agreements. With immediate liquidation, it pays off insured depositors, assumes their claims, and becomes a general creditor of the failed institution. The net cost to the CDIC is the initial payment made to insured depositors less the proceeds it may realize as a creditor from the liquidation of assets. With agency and administrative agreements, the CDIC appoints other institutions as its agent to administer and wind-down the failed institution's assets and liabilities. During the wind-down period the CDIC advances funds and guarantees funds advanced by the agent as required to meet all depositors' claims as they fall due. Unlike immediate liquidation where the CDIC's liability is limited to the amount of insured deposits held with the institution in receivership, with the agency and administrative approach all deposits (insured and uninsured) are paid by the agent as they fall due. Whether the net cost to the CDIC in paying-off all depositors will be more or less than when paying-off only insured deposits depends on the additional proceeds to be gained on the orderly realization of assets over time. The CDIC's experience with agency and administrative agreements is too recent to allow judgement on this matter.

In any case, the net cost to the CDIC in closing any one institution may not be the most important factor in deciding whether it should use one or the other procedure for closing an institution. Where a large institution fails immediate liquidation should be avoided if it results in undesirable money and

capital market conditions. On the other hand, aside from the failure of large institution, the use of agency and administration agreements, where all deposits are made whole, should be the exception rather than the rule. With frequent use the public will come to believe that all its deposits are guaranteed and have little or no incentive to monitor the riskiness of institutions. As a result, over the longer run the costs to the insurer may be higher.

In the United States, when a federally chartered bank is closed, the Federal Deposit Insurance Corporation (FDIC) is automatically appointed receiver by the Comptroller of Currency. Although state banking regulators are not required to appoint the FDIC receiver for state chartered banks, they almost always do. The FDIC uses one of two settlement options: it pays off insured depositors up to the insurance maximum which is currently $100,000 or it makes a so-called purchase and assumption transaction (P&A)[25]. Of the 747 bank failures from 1934 to 1985 in which the FDIC was receiver, 407 were concluded with P&A transactions. P&A's are in effect merger arrangements. The FDIC arranges for another institution to purchase the assets and assume the liabilities of the failed bank. The acquiring institution assumes all the deposit liabilities and most of the other non-subordinated liabilities of the failed bank. With these liabilities it acquires "clean" assets of equivalent value. Where the value of these assets is insufficient the FDIC can make up the deficiency with a subsidized loan or the purchase of unacceptable assets at their book value. In the case of mutual savings banks that have failed because of duration mismatch, the FDIC has entered into income maintenance agreements with the acquiring institution. Here it agrees to pay the difference between the average cost of funds and the yield on the acquired earning assets over some period of years.

Four reasons are usually given for the FDIC's bias in favor of merger settlements, particularly for large banks. First, the premium price paid to

acquire the failed bank's charter is ordinarily large enough to reduce the estimated cost of a merger below that of a deposit pay-off. Second, the deposit pay off with large banks involves a substantial immediate cash outlay by the FDIC. The consequent decline in its insurance fund could reduce the public's confidence in the banking system. Third, since large banks in the U.S. tend to have a large proportion of their liabilities in uninsured deposits, pay off of only insured deposits can have a disruptive effect. Finally, the FDIC is concerned with the possible negative spillover effects for sound banks from the closing of unsound banks, especially large ones. For example, when it was unable to arrange an independent merger for Continental Illinois, the seventh largest bank, the FDIC arranged a major rescue package[26]. Because of the potential losses to holders of uninsured deposits and their possible impact on other financial institutions, the FDIC offered full protection to all general creditors of Continental Illinois in case of closure. Subsequently during congressional testimony on the bank's settlement package, the Comptroller of the Currency testified that the Federal Government would not allow the nation's 11 largest banks to fail[27]. This means that uninsured deposits at large banks can be seen as fully insured deposits. The Canadian government probably would not allow any of our six largest banks to fail for similar reasons.

The government's unsuccessful rescue package arranged for the Canadian Commerical bank was induced by the fear of possible spillover effects on other financial institutions and the economy of western Canada. As it turned out, when the financial rescue was seen to be faltering, the Northland Bank also became a victim of failure, while the Mercantile Bank of Canada was forced to find a parent. Loss of confidence in the other smaller banks probably was allayed by audit reports by bankers arranged by the Inspector General of Banks.

The CDIC'a agency and administrative agreements, the FDIC's purchase and assumption transactions, as well as government financial rescue packages, address immediate problems associated with depository institution failure. However, insofar as their legacy is the perception that the safety of all deposits is guaranteed, they also reduce the constraints against risk taking that would normally be imposed by holders of uninsured depositors.

In order to promote market discipline by uninsured depositors of the risks assumed by banks, in 1983 the FDIC started to experiment with a new so called "modified payout procedure". With this procedure, used to deal with smaller banks that have failed, the FDIC makes full payments to insured depositors and only partial payments to the large depositors on the uninsured portions of their deposits. Partial payments, which have ranged from 35 percent to 75 percent of the dollar value of deposits, are based on the FDIC estimate of the proceeds from the liquidation of the assets of the failed bank. If recoveries on the assets eventually exceed the initial estimate, the uninsured depositors receive additional payments; if the proceeds from liquidating those assets fall short of the initial payment, the FDIC absorbs the loss.

(ii) Capital Adequacy

A depository institution's capital funds come from three sources: (1) shareholders equity which comprises funds invested by shareholders, contributed surplus and retained earnings, (2) general reserves and reserves set aside as appropriations for contingencies, and (3) subordinated debt. Capital serves as a buffer against losses which can lead to an institution's insolvency. When an institution experiences operating losses and when the realizable value of its assets fall short of the value of its liabilities, capital resources when adequate, make up the deficiency. If the amount of capital is inadequate, the institution may be forced into insolvency. Hence, it

follows that the protection capital provides to depositors and other creditors also enhances the public's confidence in the safety and soundness of depository institutions. (see Santomero and Watson (1977)). In case of insolvency, capital also protects the losses sustained by the Canada Deposit Insurance Corporation.[28]

The lack of capital, by itself, usually does not cause failure. Failure is precipitated by losses due to exposure to credit risk, funding risk and any of the other risks that have already been identified. However, with adequate capital to absorb losses, insolvency can be avoided. Inadequate capital may be a direct cause of failure when depositors and other creditors view it as a sign of weakness and respond by withdrawing their funds. Failure may also occur, when institutions are unable to increase their capital resources to meet the requirements of their regulators.

Disagreement exists both to the appropriate amount of capital adequate to provide an acceptable level of confidence in the depository system and to the items on an institution's balance sheet that best serve this purpose. To provide additional protection to depositors and creditors, an institution's capital base should contain three essential properties: (1) it should be permanent, implying that it cannot take flight when it is needed to maintain solvency; (2) it should be free of any mandatory fixed charges against earnings so that it does not contribute to an institution's cash deficiencies; (3) it should be subordinate to the legal rights of depositors and other creditors. Common share equity (common shares, contributed surplus and retained earnings) as well as accumulated general and contingency reserves best meet these three properties for inclusion in an institution's capital base. Historically, the adequacy of a depository institution's capital base was usually assessed in terms of common share equity and reserves, its so called

"own funds". More recently, both in the United States and in Canada, regulators have broadened their concept of capital for appraising capital adequacy.

In March 1983 the Inspector General of Banks, in a letter to the Canadian banks, set out capital adequacy guidelines which included definitions of capital for this purpose. These guidelines and their definitions of capital followed closely those issued by American bank regulatory authorities two years earlier.(see Gilbert, Stone and Trebing (1985). The Inspector General's definition of capital is summarized in Table 6. As is shown in the Table, total capital, referred to as "adjusted total capital", is divided into primary capital and secondary capital. Primary capital, which most closely meets the three essential properties of capital, is somewhat broader than the former "own funds" concept with the inclusion of preferred shares and subordinate debentures which satisfy the criteria of being permanent. Minority interest common shareholders' equity is included for the same reason in primary capital.

For determining capital adequacy guidelines the Inspector General has specified the following two consolidated bank leverage ratios:[29]

PRIMARY CAPITAL LEVERAGE

$$\frac{\text{Consolidated total assets plus off-balance sheet claims, less share investment in associated corporations}}{\text{Primary capital less share investment in associated corporations}} = \frac{\text{Gross Assets}}{\text{Net Primary Capital}}$$

TOTAL CAPITAL LEVERAGE

$$\frac{\text{Gross assets (see above)}}{\text{Net Primary Capital plus Secondary Capital}} = \frac{\text{Gross Assets}}{\text{Adjusted total Capital}}$$

The measures for primary and secondary capital used in the leverage calculations are those shown in the Table. However, primary capital in the denominator of the ratios is net of share investment in associated corporations (20% to 50% owned). Moreover, the numerator in each ratio is a gross asset

Table 6

COMPONENTS OF BANK CAPITAL
(Consolidated Basis)

Primary Capital

Common shareholders equity
Appropriations for contingencies
Permanent preferred shares
Long-term convertible preferred shares
Permanent subordinated debentures
Minority interest in bank consolidated subsidiairies

Secondary Capital

Retractable preferred shares*
Other subordinated debentures*

Adjusted total capital = Primary Capital + Secondary Capital

* A minimum five years term, with no redemptions in the first five years and the absence of special restrictive covenants. Securities which are within five years of maturity are subject to straight-line amortization to zero during their remaining term and, accordingly are included at their amortized value.

Source: Bank Act and Orders and Regulations with Guidelines and Rules (1984)

measure which adds to a bank's consolidated total assets its off-balance sheet contingent liabilities such as letters of credit and guarantees, and subtracts share investment in associated corporations. The adjustments made in the leverage ratios with respect to a bank's share investment in associated companies recognize a bank's potential commitment to an associated corporation in financial difficulties and avoids the possibility of counting capital twice. The inclusion of off-balance sheet activities removes the otherwise incentive for the banks to move activities off their balance sheets in order to avoid capital guidelines. For example, the inclusion of off-balance sheet claims in the Gross Assets calculation will reduce a bank's incentive from temporarily and artificially reducing its leverage ratio. The latter can be accomplished by transferring loans to third parties who upon payment of a fee receive a loan guarantee. The banks' assets are reduced by the amount of the loans transferred while primary capital may increase marginally as the result of an increase in retained earnings due to fee income.

The 1980 Bank Act revisions authorized the government for the first time to provide capital adequacy standards for the banks. This authority was first used in 1982 when the Inspector General notified the banks that "an appropriate optimum leverage ratio for the largest, well diversified Canadian banks should not exceed a multiple of "own funds" to total assets of 30 times. Small, less established banks were simultaneously advised to limit leverage to 20 times ...."[30] In 1983, these ratios were reconfirmed, but their calculation based on the above leverage ratios.[31] Moreover, the Inspector General has indicated that while in his monitoring of the bank's capital adequacy he will focus on their total capital leverage, the amount of their secondary capital should not exceed the amount of primary capital.[32]

Within the overall guidelines set by the Inspector General, his assessment of each bank's capital adequacy is based on that banks risk exposure as reflected in its size, its diversification of assets and liabilities, its general management strength, its liquidity and its profitability. The leverage ratios of the Canadian banks as reported in their 1984 Annual Reports are shown in Table 7 for their 1983 and 1984 fiscal years. All the large banks reduced both their primary capital and adjusted total capital leverage ratios in 1984 from the previous year level. Comparable data for earlier years (not shown) has been reported only by the Bank of Nova Scotia and the Royal Bank. The Bank of Nova Scotia's primary capital leverage ratio increased from 27.4 in 1977 to 33.9 in 1982, before declining to 27.8 in 1984. Its adjusted total capital leverage was 24.3 in 1977 and reached 27.8 in 1980 before it declined to 21.9 in 1984. The Royal Bank's primary capital leverage ratio reached 37.0 in 1982 and its adjusted total capital leverage ratio reached 27.8 in 1981 before declining to the lower values shown in the table.

The Canadian chartered banks significantly increased their leverage ratios during the 1970's and early 1980's. For example, their leverage ratios of total assets to total equity increased in almost every year from 21.5 in 1971 to 31.7 in 1981 while their ratios of total assets to total capital increased, but with less consistency, from 20.0 in 1971 to 24.5 in 1981 (Bank Profits, 1982: 93).

In their 1983 and 1984 fiscal years, the Canadian-owned chartered banks added $2.4 billion to their capital base with the issue of new stock. Some 69 percent of new stock issues was in the form of prefereed shares; in their 1984 fiscal year alone $1.2 billion was raised in new preferred share issues. A large proportion of these shares were purchased by the trust companies who could earn a better return from them than from alternative lending

Table 7

CAPITAL LEVERAGE RATIO'S: MAJOR CANADIAN BANKS *
(Fiscal year end, october 31)

	Primary Capital to Gross Assets		Adjusted Total Capital to Gross Assets	
	1983	1984	1983	1984
Royal Bank	31.2	27.8	21.7	20.0
Bank of Nova Scotia	31.8	27.8	23.6	21.9
Canadian Imperial Bank of Commerce	40.0	32.3	23.8	21.7
Toronto Dominion Bank	26.3	22.7	20.4	18.9
Bank of Montreal	26.5	25.9	20.3	19.1
National Bank of Canada	34.5	25.0	25.0	17.2
Continental Bank	N/A	N/A	20.0	20.0
Mercantile Bank of Canada **	22.7	23.3	18.2	18.9
Bank of British Columbia**			22.7	20.0
Canadian Commercial Bank	24.5	25.9	20.2	20.8

*Based on leverage ratios as specified by Inspector General of Banks unless noted to be otherwise.

**Calculation does not strictly follow that of the Inspector General.

Source: Annual Report, 1984, various banks.

because dividends could be received by them tax-free. At the time, this created some concern, for the Inspector General of Banks and the federal Superintendent of Insurance, over the possibility that the institutions were shifting capital among themselves rather than raising new funds from investors.[33] If indeed the depository institutions were engaged in a deliberate swapping of capital amongst themselves, this resulted in double counting of capital in the financial system. Double counting could give a false impression of the soundness of the system, raising the question of the extent to which financial institutions should be allowed to own each others capital.

Aside from the concern expressed over capital adequacy by the Inspector General of banks, the Canadian banks have been prompted to reduce their leverage ratios in order to lower their funding costs in international money markets. Before the recent reversal in their leverage ratios, the Canadian banks paid some 60 basis points more for borrowing in foreign capital markets than their American counterparts who enjoyed the benefit of lower leverage ratios[34]. Following the reduction in their leverage, the spread was lowered by 10 basis points (Financial Times of Canada, May 7, 1984, p.5).

Before its recent reversal, the increase in the banks capital leverage ratios, suggests that they increasingly depended upon their depositors and other creditors as a substitute for capital to support their asset growth.[35] This in effect shifted a significant proportion the banks' risk exposure from their stockholders to the Canada Deposit Insurance Corporation, particularly since the banks' cost of deposit insurance is not related to the risks undertaken by them. While their shareholders were rewarded as a result of the higher proportion of earning assets to equity employed, the CDIC, uninsured depositors and other creditors increased their potential for loss in the event of insolvency. It has been argued that higher capital ratios (lower leverage

ratios) are required to act as a substitute for the discipline depositors would provide were they not covered by deposit insurance (Buser, Chan and Kane (1981); Flannery (1982); Horwitz (1984)).

Whether higher capital ratios would change institutions behaviour with respect to their assumption of risk is uncertain. One would expect that higher equity requirements, which enlarge investors' stake in an institution's financial conditions, to also increase their demand for prudent management policies. At the same time, if the public associates its risk with an institution's capital ratios, managers should be encouraged to increase their institution's capital base. On the other hand, since higher capital standards (lower capital leverage ratios) may also result in lower return for investors, the institutions' managers may be encouraged to invest in more high risk/high return assets (see Jensen and Meckling (1976), Koehn and Santomero (1980)), McComas (1985), Mingo (1976)). This may be avoided by confining higher capital requirements to increases in subordinated debt whose holders do not share in profits but suffer the possible consequences of higher institutional risk exposure. If subordinate debt holders, demand a risk premium in proportion to their perceived risk, managers may wish to hold their costs down by reducing their institutions' exposure to risk. If this happens, an additional subordinate debt requirement may provide an incentive to institutions to control their risks.

If investors' assessment of a depository institution's risk were reflected in the rates it pays on its uninsured deposits and the market prices of its long-term debt and stock, one should expect market forces to be an alternative to regulation of capital adequacy. Unfortunately, because of lack of information and expertise needed to assess the risk posed by alternative capital ratios, market forces are not a complete substitute for regulation.

Even under conditions of complete information and the ability to act upon it, the market cannot be expected to include the social costs of an institution's failure and would therefore require too little capital to ensure the safety and soundness of the financial system.

Although various theoretical studies have been made to define capital adequacy, these do not provide policy solutions. For example, a theoretical estimate of optimal capital is provided by Eli Talmor (1980) based on a gambler's ruin model and by George Morgan (1984) based on the capital asset pricing model. However empirical work on bank failures in the United States, show that other things equal, better capitalized banks have proven to be safer and sounder. (Orgler (1975); Sinkey (1978); Avery and Hanweck (1984); Bovenzi, Marino and McFadden (1983); Short, O'Driscoll and Berger (1985))

Historically, leverage ratios have played a more important regulatory role for trust and loan companies than banks. In addition to protecting depositors and other creditors, leverage ratios have been used to control the growth of trust and mortgage loan companies. Under the federal Loans Company Act, a loan company's initial leverage (ratio of debt to capital and surplus) is set at four times and a trust company's at 12.5 times. These ratios can be increased with the approval of the Minister of Finance. Over the years, the maximum ratios for trust companies have been steadily raised from 5 in 1914 to 7 in 1931, 10 in 1947, 12.5 in 1958, 15 in 1965 and 20 in 1970. For loan companies the ratio has been increased from 4 in 1914 to 6 in 1927, to 10 in 1948, 12.5 in 1958, 15 in 1965 and 20 in 1974. In 1974, the statutory limits were removed and these companies are now allowed to exceed 20 times with the approval of the Minister of Finance but only if they satisfy financial standards specified by their regulator.

The maximum ratio that has been approved for a federal institution has

been 25 times. At the end of 1984, the average leverage ratio of the trust and mortgage loan companies (excluding bank mortgage subsidiairies) was 21.4 times.

Proposals for Revision of the Loan and Trust Corporation Legislation and Administration in Ontario (1983) included a provision for a minimum borrowing multiple of 10 times which could be increased to a maximum of 25 times for institutions meeting prescribed standards and control. In its response to these proposals, the Trust Companies Association of Canada (February 1984) argued that since major trust companies are as financially sound as the major chartered banks, their maximum leverage ratio should be similar to those of the banks. The Association recommended that the maximum be set at 25 times, a level which the Inspector General now considers too high for the banks.

Recent experience with trust and loan company failures indicate that regulators may have responded too readily to requests for higher borrowing ratios. In some instances the higher ratios resulted in growth rates that could be achieved only by companies adding assets of dubious quality to their balance sheets[36]. Only in the exceptional case can margins of assets over liabilities of five percent or less be considered sufficient to provide adequate protection against insolvency.

IV FAILURE PREVENTION: EXAMINATION AND EARLY WARNING SYSTEMS

Regulatory agencies of depository institutions have interpreted their "safety-and-soundness" mandate as one of failure prevention (Sinkey 1977:25). Towards this end, American unlike Canadian regulatory agencies have made on-site examination the backbone of their supervision. As described by Bentson (1973), examiners arrive unannounced and have virtually unlimited access to the records of the institutions to be examined. The examiners look at the documentation and collateral for most large loans and a sample of small loans and they check the institutions compliance with federal and state laws. The institutions' managers and management procedures and policies also receive close scrutiny. It is generally assumed that field examination has a comparative advantage for preventing failure due to mismanagement and/or dishonesty[37]. However, the examiners' ability to uncover serious problems of insider dealing, fraud and defalcation have been far from perfect. As Bentson (1973) has observed, of the 56 bank failures that occurred in the United States between January 1959 and April 1971, 59 percent were rated as "no problem" at the examination just prior to their failure. Sixty-six percent of the 56 failures turned out to be the result of fraud and irregularities[38].

In 1978, following pressures from Congress as a result of the failure of the Franklin National Bank, the three federal bank regulatory agencies in the United States (Comptroller of the Currency, Federal Reserve System and FDIC) adopted a uniform interagency system for use by examiners in rating the condition and soundness of commercial banks. (See Juncker (1978)). While previously examiners tended to view asset quality as the chief determinant of bank risk exposure, the interagency system, known by its acronym "CAMEL", focuses on five aspects of a bank's operations and conditions: Capital adequacy, Asset quality, Management, Earnings and Liquidity. It is generally assumed

that banks are typically threatened with failure because of loss of asset quality, while the other four measures indicate their ability to stay open despite such loss.

In addition to a separate evaluation of each of the five elements of a bank's condition, a bank receives a composite (or performance) rating based on examiners' assessment of its overall strength. These ratings, from 1 to 5 determine the extent to which a bank receives supervisory attention between examinations. Banks rated 1 or 2 are considered sound, whereas banks rated 3, 4 or 5 are considered weak. A bank rated 5 is subject to constant monitoring and is usually required to take specified corrective actions.

Although Canadian regulatory agencies have a statutory requirement, similar to their American counterparts, to have depository institutions examined at least once a year, on-site supervision has generally taken the form of an inspection rather than an examination. It has usually been assumed that it is the external auditors' responsibility to examine the quality of a bank's assets and to report any deficiencies in prudent banking practices, particularly as they relate to statutory and regulatory provisions. The reports provided by the external auditors, in turn, provide most of the background information used by the Inspector General of Banks when conducting his annual inspections. Even if he would want to conduct on-site examinations similar to those in the U.S. he could not do so because his office does not have the staff. For example, recently, in order to restore confidence in the smaller banks, he had to request the major banks to make the examinations on his behalf.

The Superintendent of Insurance who supervises all federal loan and trust companies and by agreement some provincial institutions, retains his own staff of some 60 examiners. While their function is similar to that of their American counterparts, until recently it has been much less formalized.

During the 1970's researchers in the United States started to develop bank failure prediction models. These models, described briefly below, employ a wide array of financial data available from examination and/or call reports, as well as different statistical techniques, to predict bank failure or to distinguish between sound and weak institutions[39]. Based on this research, the federal and some state regulatory agencies have developed so called "Early Warning Systems".

A major premise underlying most of the failure prediction models is that institutional failure is a continuous process which can be identified from an ex post analysis of financial data. As Pettway and Sinkey (1980:p. 138) have stated, "Since the failure path tends to be a decaying one rather than an explosive one; identifying banks with financial difficulties is a first step toward achieving the failure prevention goal"[40].

One group of researchers, in their attempt to develop failure prediction models, have used accounting data of known problem institutions and compared this with that of healthy institutions. Financial characteristics of distressed institutions are then applied to find similar weakness among existing institutions[41]. These models do not allow for the possibilities that factors that contribute to failure many change over time.

Other studies have developed a measure of vulnerability which is independent of an actual classification of institutions as failures and nonfailures or as problems and non problems. Using a rank score technique, a composite ranking of institutions is derived by weighting various financial ratios that are considered indicative of financial strength or weakness. (See Korobow and Stuhr (1975); Korobow, Stuhr and Martin (1976) and (1977)). Institutions with a composite score above a certain threshold are considered resistant to failure while those below are deemed vulnerable to failure.

The Federal Reserve System in the United States uses a multistage screening process involving the eleven financial ratios shown in Table 8. Seven of the ratios (identified with an asterisk) are combined to form a "composite" bank score. A bank is considered an exception if its composite score falls below a predetermined cutoff level. Separate cutoff levels are also specified for each of the eleven financial ratios and banks below the individual cutoffs are also treated as exceptions.

Table 8

FEDERAL RESERVE BOARD
SURVILLANCE RATIOS AND COMPONENTS OF THE COMPOSITE SCORE

1.* Loans and Leases/Total Sources of Funds
2. Liquid Assets/Total Sources of Funds
3.* Interest-sensitive Funds/Total Sources of Funds
4.* Primary Capital/Risk Assets
5. Total Capital/Risk Assets
6. Net Income/Total Assets - Cash Items
7.* Total Operating Expenses/Total Operating Revenue
8. Dividends/Net Income
9.* Gross Loan Losses/Net Operating Income + Provisions for Loan Losses
10.* Noninterest Expenses/Total Operating Income - Interest Expense
11.* Commercial and Industrial Loans/Total Loans, Gross

Note: * identifies components of the composite score.

Source: Korobow and Stuhr (1983) p 29.

A somewhat different approach uses what is referred to as outlier analysis. Vulnerability to failure is assumed if an institution's performance with respect to some or all of a selected group of relevant financial ratios is atypical to that of its peer group. (See Sinkey (1977) and (1979)).

A major weakness of all of these models is their use of data internal to the institutions and hence their focus primarily on microeconomic determinants of failure or vulnerability to failure. By contrast, more recently Bovenzi and Nejezchleb (1985) have studied the impact of changes in the macroeconomic environment on the failure of financial institutions.

Finally, mention should be made of the attempt to develop early warning systems of institutional failure by using stock market prices. (See Pettway (1980); Pettway and Sinkey (1980)). According to the "efficient market" hypothesis, stock prices represent a firm's intrinsic value and any new information regarding its condition is quickly and accurately reflected in the market price of its stock. If this is indeed the case, the market price of depository institutions serve as an early warning of changes in their health. Similarily, changes in their financial condition may be revealed by the rate of interest they have to offer relative to their peer group for attracting depositors.

To complement their traditional examination systems, all five of the federal financial regulatory agencies in the United States now use early warning systems. The Federal Deposit Insurance Corporation and the National Credit Union Administration use the outlier approach. The Federal Reserve Board and the Comptroller of the Currency use the rank score technique while the Federal Home Loan Board employs both methods. In all cases, the primary purpose served by these early warning systems is to rationalize the agencies' allocation of examiner resources. Moreover, since examiners concentrate primarily on an

institution's existing conditions, the early warning systems by flagging difficulties before they become problems may identify potential problems.

In Canada, where the number of depository institutions is significantly smaller than in the United States, and where on-site regulatory examination has not been given the same importance, there has not been the same requirement for the establishment of early warning systems. The federal Superintendent of Insurance and the Ontario regulatory authority have instituted computerized information systems which are the first step toward developing failure prediction models. However, given the larger number of institutions under the surveillance of the Canada Deposit Insurance Corporation, this agency as recommended by the Wyman Committee, should be responsible for implementing an early warning system to screen the behaviour of all insured institutions.

Early warning systems as now employed in the United States or the simpler screening techniques used by at least two of the regulatory agencies in Canada, do not substitute for adequate on-site examination. At best they are a useful complement to on-site examination. Furthermore any early warning system serves no useful purpose for failure prevention unless the regulatory agencies have the authority, and use it, to force institutions to change their operating behaviour. In the United States the FDIC has authority to issue cease-and-desist orders, impose civil money penalties, suspend or remove officers and directors, and ultimately to terminate the insurance of any insured bank. Despite this authority, it has tended to rely mainly on informal agreement with offending institutions and on more frequent examination of their operations. Its Canadian counterpart, the CDIC has no power to apply disciplinary measures on member institutions short of termination of insurance which is tantamount to a declaration of insolvency. The Wyman Committee, has recommended that the CDIC be provided with powers similar to those enjoyed by the FDIC.

V - THE REGULATORY FRAMEWORK FOR FAILURE PREVENTION

(1) Deposit Insurance

Deposit insurance was introduced in 1967 with the primary objective to protect small unsophisticated depositors from the private cost of failure of depository institutions. These depositors, in particular, are susceptible to risk exposure because of their inability, or the high informational cost, of identifying risky institutions. Moreover, insofar as they are unable to diversify their relatively small savings, they hold a large proportion of their financial assets in the form of deposits in order to enjoy the benefits of the payments system. Deposit insurance, by transferring the small depositors' risk of institutional failure to an insurer, allows them to optimize their use of the payments mechanism.

When government deposit insurance was first introduced in the United States during the 1930's the overriding reason was the protection of the economy from the impact of disruptions in the intermediary process caused by "runs" on the banks. In 1983, when the CDIC's legislation was amended, the Minister of State for Finance noted that an important objective of deposit insurance in Canada also was to "assist in maintaining the confidence and stability in the financial system".

As noted earlier, the solvency of all depository institutions can be threatened if as a result of the failure of one or a small group of institutions the public loses confidence in the solvency of the system. In the scramble to withdraw deposits "healthy" as well as weak institutions can become victims of failure. The resulting rationing or recall of loans by institutions subject to runs can cause real economic problems as productive investments are terminated and intertemporal resource allocation is disturbed (see Bernanke (1983), Diamond and Dybvig (1983)). It is generally assumed that credible deposit insurance

eliminates the initial reason for a run if the convertibility of a large proportion of deposits is assured. As Friedman and Schwartz (1963:440) have observed, deposit insurance is "a form of insurance that tends to reduce the contingency insured against".

It can be argued that instability in the financial system caused by runs on depository institutions is best avoided by appropriate use of the central bank's lender of last resort facility. France and Germany do not have deposit insurance and rely solely on central bank liquidity support to avoid wide spread runs. In the latter part of 1985 the small regional Canadian banks experienced runs despite deposit insurance and government guarantees to uninsured depositors of two failed banks. Further runs were avoided because of audit reports of the solvency of the smaller banks requested by the Inspector General of Banks and because of the liquidity support provided by the Bank of Canada.

The central bank's role as protector of the nation's payment system is probably made easier and more effective where deposit insurance adds confidence to the safety of depositors' accounts. While it is usual to assign illiquidity problems to the central bank and insolvency problems to the deposit insurer for remedial action, the distinction between illiquidity and insolvency can be ambiguous. On site examination and early warning systems can help to remove much of this ambiguity.

Where depository institutions can be incorporated and regulated by one of eleven jurisdictions, as is the case in Canada, central government insurance can also serve to raise minimum financial standards of these institutions. By applying minimum eligibility standards for insurance and by supervising the operations of member institutions, the financial standards set by the insurer can be generalized throughout the system. Before 1980, some trust and loan

companies incorporated in Alberta did not meet the minimum eligibility standards of Canada Deposit Insurance Corporation (CDIC). The CDIC insured the deposits held with these institutions but the provincial government agreed to indemnify the Corporation in case of loss. The indemnity agreement was terminated following revisions to Alberta's regulatory framework to meet the standards required by the CDIC. In his evidence to the House of Commons Standing Committee on Finance Trade and Economic Affairs, in 1976, Mr. R. Humphreys, Superintendent, Department of Insurance, noted that ... "without attempting to supersede the regulatory responsibilities of the provinces, the corporation has considerable influence in bringing about more or less uniform standards of supervision and regulation in all the jurisdictions where deposit institutions have been incorporated." (House of Commons, Standing Committee of Finance Trade and Economic Affairs, 1976:1.24)

Finally, the encouragement of more competition probably also was an implicit goal of the federal government in introducing deposit insurance in 1967. Deposit insurance has made it easier for new and smaller institutions to compete with the larger and longer established ones for public deposits. The growth of nonbank depository institutions and the entry of regional Canadian banks as well as foreign bank subsidiaries was undoubtedly made easier with the existence of government deposit insurance.

While deposit insurance has satisfied what the Wyman Committee recommends should be its primary objective - to insure small unsophisticated depositors - it is now generally recognized that it has also unwittingly encouraged institutions to increase their risk exposure and thereby their probability of failure. The provision of deposit insurance at a flat-rate or non risk-adjusted price has created insurance related difficulties known as

moral hazard and adverse selection problems[42]. Because insured institutions do not have to pay correspondingly higher insurance rates when they invest in higher risk assets or partake in riskier activitis, they are encouraged to increase their risk exposure to enhance their expected return. (see Flannery (1982); Buser, Chen and Kane (1981)) This tendency toward excessive risk taking is exasperated by self dealing made easier where there is closely held ownership. Furthermore, with deposit insurance as well as a perception by uninsured depositors and other creditors that government provides de facto 100-per cent protection, there is little or no incentive for them to monitor the institutions' risk-taking behaviour. This perception, as noted earlier, has been strengthened by the protection provided by the CDIC to all depositors and other creditors when winding-down failed institutions under agency and operating agreements and by provincial and federal government "bailout" arrangements. When depositors have little reason to be concerned about the financial conditions of depository institutions they will also be encouraged to leave their funds with institutions who because of their riskier activities offer higher interest rates. This, provides a further incentive toward excessive risk taking.

Various reforms to reduce the incentives toward excessive risk taking by introducing market discipline have been proposed (Binhammer (1985), Kane (1985)). The Economic Council of Canada (1976) and more recently the Canadian Bankers' Association (1984) have recommended the introduction of a risk-related deposit insurance premium structure. In the United States, the reports of both the Federal Deposit Insurance Corporation (FDIC:1983) and the Federal Home Loan Bank Board (FHLBB:1983) also have proposed the adoption of risk-related premiums. The FDIC has suggested a trial system whereby each insured bank would be placed in one of three risk-classes and a premium rate assigned to each group according to its credit and interest-rate risks relative to capital.

Although a strong theoretical case can be made for risk-related deposit insurance premium rates, up to now this has been overshadowed by both real and perceived difficulties for their implementation. It is usually assumed that we do not have the information base, nor do we know what the base should be, for determining risk-related premiums. Moreover, implementing a system with improperly priced premiums would only add to already perverse risk-taking behaviour. The difficulty of implementing a comprehensive, actuarially sound, risk-based insurance premium structure is admitted. However, this does not mean that it is impossible to design a structure that avoids the danger of preverse risk-taking and at the same time reintroduces some discipline on institutions incentive toward excessive risk exposure.

Two approaches can be used to implement a risk sensitive premium structure. One scales premiums to a measure of an institution's overall risk and the other to individual risks. There also are at least two ways for deriving a measure of an institution's overall risk. One relates institutional failures to a number of financial variables and estimates statistically the relative importance of each of these factors. Insurance premiums can then be set from these estimated weights. This approach follows that used in failure prediction models outlined earlier. It suffers in that it is backward looking and as such does not capture new and current behaviour affecting an institution's risk exposure.

The other approach for estimating an institution's overall risk with one measure has been offered by Merton (1977)[43]. He has suggested using the analagous relationship between deposit guarantees and put options to value deposit insurance. According to this approach, the depositors' claim can be thought of as the sum of riskless debt and a short position in a put option on the deposit institutions' assets. The short put position reflects the

institutions' ability to "sell" their assets to depositors for the face value of their deposits. For writing these put options, depositors should receive their fair market value, that is, a risk premium which is included in the interest rate paid to them. Deposit insurance on the other hand, can be thought of as a long position asset value put option extended by the insuring agency to depositors and offsets their short put leaving their total position riskless.

If deposit insurance premiums are correctly related to risk, they should reflect the fair market value of these put options. Marcus and Shaked (1984) have pointed out that the use of the option-pricing approach to estimate appropriate insurance premium rates allows not only institution specific estimates of the correct premium, but also the calculation of premiums with data collected over relatively short time periods. Unfortunately, the standard option theory used to find an equation for the present value of an insurer's liability on which to base premium rates requires variables not directly observed in the market. Surrogate estimates provide an equation which may not be sufficiently robust for actual premium setting.

Scaling insurance premiums to an institution's individual risks as reflected by current income and balance sheet data, appears to be a more promising approach and can be developed along with early warning systems. In Part II we outlined the major risks faced by a deposit-taking institution. The composition of an institution's assets and the dollar volume of classified assets relative to its capital base serve as a good starting point for evaluating credit risk. However, this implies adequate on-site examination to ensure that the quality of all non-marketable loans are appropriately classified according to their risk. Duration and maturity gap analysis can be used to estimate interest-rate risk (Cooper (1977). The proportion of readily marketable assets and the degree of dependence on potentially volatile deposits

provide a measure of an institution's liquidity and funding risks. Contingent liability risks, and management risk especially as it relates to moral hazards, while somewhat more difficult to quantify, can be scaled with appropriate on-site examination. Recent failures of depository institutions suggest that management risk may also be related to type and concentration of ownership.

The use of variable-rather than a uniform-premium system would alter managerial incentives in a favourable way. Complete accuracy in setting premiums, while desirable, is not entirely necessary. It is sufficient if premiums are accurate on average and there are no systematic errors in setting them. Accuracy in setting premiums can be gained by removing information asymetries with incentives for institutions to reveal or signal the true nature of their risks. (see Harris and Raviv (1979)). Kane (1985) suggests that if the deposit insurer were to offer a range of different types of policies, each with its own coverage and premium rate, managerial assessment of the value of different types of coverage and their selection of a specific type would signal information of their own risk perception. Another method to provide an incentive to institutions to reveal the true nature of their exposure would be the imposition of penalties if subsequent to a rate setting it was discovered that information provided was incorrect or that it was knowingly withheld.

Insofar as a risk-related insurance premium system exposes riskier institutions, it can be argued that entry would be more difficult as would be the viability of small regional institutions. New, as well as regional, institutions are not necessarily riskier and consequently need not be placed in an adverse higher-rated premium classification. Indeed, risk related insurance would be an effective deterrent from entry by socially undesirable owners and managers.

Short and O'Driscoll (1983) have proposed private insurance as an alternative to governmental deposit insurance. They argue that when the government insurer has a monopoly he is overly sensitive to overpricing of risk. This sensitivity is reinforced by industry pressures to keep premiums as low as possible. As a result government deposit insurance will inevitably remain underpriced, undermining the rational for introducing variable insurance premiums. To remedy this problem, Baer (1985) proposes a public-private insurance scheme that would allow premiums to be set in the private sector while most of the insurance is provided by the public sector. Under his scheme private insurers write matching policies for X percent of depositors losses while the government insurer write matching policies for 100 percent minus X percent of the losses. The government insurer sets its premium equal to the premium charged by the private insurer.

It is questionable whether private insurance schemes would be viable. Where underlying risks are not sufficiently diversified, as is the case with depository institutions, macroeconomic changes can adversely affect a large number of institutions at more or less the same time causing a ruinous bunching of insurance claims. Unlike a government insurer, private insurers would also find it difficult to price insurance contracts that include the social costs of system wide catastrophes. This was the case with financial institutions that extended loans to the agricultural sector during the depression of the 1930's. Rather than allow these institutions to foreclose on farmers, the federal government set up the Canadian Farm Loan Board and later the Farm Credit Corporation.

Campbell and Glenn (1984) suggest a way around the difficulty of private insurers to write contracts that take into account the social costs of failure. Private insurers might be allowed the right to cancel policies when

the net worth of depository institutions reached a designated level and pay a predetermined penalty to the government. Upon payment of the penalty, the government would decide whether the institutions should be declared insolvent. If it decided that the institutions should continue to operate and insurers to honour their insurance contracts, the government would assume total responsibility for all subsequent insurance claims.

Private insurers probably will also be reluctant to insure depository institutions with a regional concentration of activity because of imperfect diversifability of their operations. Recent problems experienced by institutions in Western Canada with real-estate loans illustrate these difficulties.

Paul Horvitz in his discussion of Campbell and Glenn (1984) notes that one can introduce market discipline using private insurance companies without having them actually write deposit insurance contracts. All depository institutions could be required to sell subordinated debt, say five percent of their deposits, to private insurance companies. Market forces would value this debt and increase the cost of capital to institutions that operate in a risky manner.

With private deposit insurance the moral hazard problem remains because the insurer's difficulty in acquiring information. The inability of private insurers to write optimal contracts under conditions of uncertainty is greater for a private than a public insurer. Hence we conclude that the complete replacement of government deposit insurance with private insurance does not appear to be a viable alternative. Nor does it appear that private insurers have sufficient resources to undertake the full responsibility. This, however, does not exclude the possibility of private companies providing prescribed amounts of deposit insurance and the CDIC reinsuring claims above a certain

level. This might be a way of introducing some market discipline into the system without sacrificing its credibility.

An alternative to risk-related deposit insurance is co-insurance. Various co-insurance systems have been proposed[44]. The Canadian Bankers' Association (1984) has proposed that the CDIC fully insure deposits up to $20,000 and only 75 percent of any excess up to a total amount of $73,300. This total amount has been calculated so that the maximum allowable insurance claim would remain at its present $60,000 level. The Wyman Committee presented a co-insurance proposal that provides 90 percent coverage for each deposit insured up to a maximum of $100,000. This system is to be implemented over a three year period with depositors remaining fully insured up to $60,000 in the first year. In each of the next two years the maximum insurable amount would be decreased by $20,000 so that only in the fourth year following implementation would the depositor receive only 90 percent of his first dollar of deposit.

A major criticism of co-insurance, especially of the type proposed by the Wyman Committee, is that it compromises deposit insurance's primary objective of protecting small unsophisticated depositors. It is also based on the questionable assumption that depositors can, and will, force sufficient discipline on institutions' risk-taking behaviour. With information asymetries and monitoring costs depositors will be inclined to rely on their ability to use the political process to force governments to honour their claims in case of failure rather than try to directly impose discipline on the institutions. On the other hand, even with complete information a co-insurance system would not be desirable because shifting of institutional failure onto depositors, would make the system more prone to "runs". Indeed with deposit "flights to quality" increased, the Bank of Canada in its role of lender of last resort could become the de facto insurer of institutional failure. (see Kanatas (1984).

An alternative insurance scheme to increase market discipline is one that insures only transactions type accounts. This might be considered sufficient to satisfy the goal of protecting the small unsophisticated depositor, particularly if one interprets the goal in terms of allowing them to optimize their use of the payments system. By only insuring transactions accounts little harm may be done to the stability of the system goal as well. The major benefit to be hoped for is the market discipline that the uninsured illiquid and savings account depositors may exert on the risk behaviour of institutions. To shift their risk these depositors could demand the inclusion of covenants in their deposit contracts which constrain an institution's dividend, investment and financing behaviour (see Furlong (1984)). Insurance schemes that base coverage on maturity rather than the amount of a deposit assume that a clear distinction between accounts can be made with respect to maturity. Deposit innovation has already removed much of the former differences and further competition for deposits is likely to continue this process.

(ii) Canada Deposit Insurance Corporation (C.D.I.C.):Operations and Loss Experience

The CDIC was established in 1967 by the Canada Deposit Insurance Corporation Act. (R.S.C. 1970, c.C-3 as amended) as a proprietary Crown corporation. The Corporation's principal objective is to provide insurance on deposits with federal member institutions (banks, trust, and loan companies) and with provincial member institutions (trust and loan companies) up to a stated amount per depositor per institution. For purpose of insurance, deposits are defined broadly and generally include all deposit-like instruments accepted on demand or that can be claimed within five years. The maximum amount per deposit, initially set at $20,000 was increased to $60,000 effective in January 1983.

A provincial institution may become a member of the CDIC if it is authorized by the province of its incorporation and if it agrees not to exercise powers substantially different from those allowed under federal legislation. Two months before the CDIC was established, Ontario had introduced deposit insurance to Canada with a plan of its own covering the 25 trust and loan companies in the Province. This plan was very similar to the one the federal government subsequently instituted. Upon the availability of deposit insurance from the CDIC, the Ontario plan was suspended and all its incorporated trust and loan companies were required to apply to CDIC for insurance. The other provinces, except Quebec, followed suit. Quebec instituted its own plan of deposit insurance administered by the Quebec Deposit Insurance Board (QDIB). The Board is empowered to guarantee not only deposits within the province, but also deposits accepted outside the province by institutions incorporated in Quebec. In order to avoid duplication of service, the federal government and the Government of Quebec with the concurrence of the other provinces agreed that deposits located in Quebec with provincially incorporated trust and loan companies would be guaranteed by the QDIB and deposits located outside Quebec with these companies would be insured by the CDIC. Aside from guaranteeing deposits located in Quebec held with all nonbank depository institutions including credit unions and caisses populaires, the operations of the QDIB are similar to those of the CDIC. The CDIC is empowered to make short-term secured loans to the QDIB to enable it to meet emergency liquidity needs that may arise from its insurance operations. During 1981-82 $80 million was advanced to the QDIB under a $100 million line of credit agreement with the CDIC.

Over the years the CDIC has also functioned as a lender of last resort by making secured loans and advances to member institutions and by purchasing

assets from them. Under separate legislation - the Investment Companies Act and the Co-operative Credit Association Act - the CDIC is empowered to make short-term loans as a lender of last resort for liquidity purposes to Canadian controlled sales finance companies and to cooperative credit societies and provincial organizations responsible for stabilization or liquidity funding for credit unions. Up to the end of 1984 the CDIC had not made any advances under this separate legislation. Any advances that may be made are borrowed in turn by the CDIC from the federal government's Consolidated Revenue Fund.

In its first year of operation, the CDIC insured $17.1 billion in deposits held with 28 federally incorporated institutions of which 10 were banks, and with 41 provincially incorporated trust and loan companies. By year end 1984, insured deposits had grown to $162 billion. Of this amount, $149 billion was deposited with 140 federal institutions including 72 banks, and $13 billion with 46 provincial institutions.

Upon formation, the Federal Government subscribed and paid for $10 million of the CDIC's capital stock which the corporation redeemed in 1977 without affecting the governments control or sole ownership.[45] The CDIC's operations are financed by member institutions premium assessments, investment income and secured loans from the Federal government. The corporation's inital authority to borrow $500 million from the government's Consolidated Revenue Fund was increased to $1.5 billion in 1983,. It used this authority during its first four years and then not again until 1982 when it borrowed $140 million to help finance direct liquidity loans to troubled member institutions. It started to borrow sustantially in early 1985.[46]

Up to the end of 1984 member institutions had paid the CDIC over almost 18 years a total of $215 million premium income. The maximum premium rate that a member institution can be charged in any one year is one-thirtieth of one per

cent of its insured deposits. The maximum rate was charged in each of the corporation's first six fiscal years and again in 1983. In each of the intervening years member institutions paid reduced premiums. The average annual reduced premium rate during these years was only approximately one-fiftieth of one percent of insured deposits.[47] As provided in section 19(8) of the Canada Deposit Insurance Corporation Act, a reduced premium paid by a member institution in any one year can not be less than the greater of $500 or an amount that, together with the aggregate of premiums previously paid by the member institutions, is equal to one-sixth of one percent of the insured deposits to which the reduced premium applies.

Annual premium income, together with net earnings, are accumulated in the Corporation's "Deposit Insurance Fund". This Fund increased in every year until 1982 when it reached $253 million. In the following two years, as discussed below, it was placed in a deficit position amounting to $871 million at the end of 1984. Where, in the opinion of the Corporation, the Fund, at the end of a financial year, is adequate to meet its existing and potential liabilities, it may pay a premium rebate to member institutions that have paid premiums for at least five years. The total amount of premium rebates that can be paid in any one year is limited to the total amount of premiums collected in the previous premium year. A $3 million premium rebate was paid in 1978 and another amounting to $6 million in the following year to 57 member institutions.

The CDIC's loss experience is summarized in Table 9. Up to May of 1985 it had to deal with sixteen institutional failures; ten trust companies, three mortgage loan companies, two mortgage investment corporation and one bank. Eight of these institutions were almost immediately placed into liquidation upon failure. Depositors were paid the amount of their insured deposits and the CDIC took over the claims of the insured depositors against the liquidated

TABLE 1 - CDIC CLAIM EXPERIENCE

Member (disposition)	Year	Jurisdiction	CDIC Payment/Recoveries[1] $ 000,000
1. Security Trust (Liquidated)	1969	Alberta	10.3/10.3 plus interest repaid by province of Alberta
2. Commonwealth Trust (Liquidated)	1970	British Columbia	5.4/5.4
3. Astra Trust (Liquidated)	1980	Federal	21.6/18.1
4. District Trust (Agent-Sterling Trust)	1982	Ontario	44.5*/33.5*
5. Crown Trust (Agent-Central Trust)	1983	Ontario	297.7*/
6. Greymac Trust (Agent-Standard Trust)	1983	Ontario	159.9*/
7. Seaway Trust (Agent-Midland Bank of Canada; placed in liquidation June 1984)	1983	Ontario	140.2*/140.2* 150/
8. Seaway Mortgage Corporation (Agent-Midland Bank of Canada)	1983	Federal	64.5*/
9. Greymac Mortgage Corporation (Agent-Standard Trust)	1983	Federal	105.2*/
10. Fidelity Trust (Agent-First City Trust)	1983	Federal	296.1*/
11. Amic Mortgage Corporation (Liquidated) July 83	1983	Federal	22.8/15
12. Northguard Mortgage Liquidated Dec 84	1984	Federal	27.8/
13. Pioneer Trust Liquidated Feb 85	1985	Federal	
14. Western Capital Liquidated Apr 85	1985	Federal	305/ Trust
15. London Loan Limited Liquidated Apr 85	1985	Ontario	
16. Canadian Commercial Bank Apr 85		Federal	75**/

1. Net amounts recovered through disposal of assets.
* Loans and loan guarantees to agents under agency and administrative agreements.
** Represents the CDIC participation in the $255 million support package for the bank.

institutions. In the case of the Security Trust Company in 1968, the first member institution to fail, the $10.3 million paid out to depositors was subsequently repaid with interest to the CDIC by the Government of Alberta. Until 1980 the Alberta government had agreed to indemnify the CDIC for any losses on account of Alberta institutions which were insured by the Corporation but which did not meet its minimum financial standards for membership. A similar agreement had been in effect with the Government of Ontario to allow its institutions to become members before the CDIC had the opportunity to have them examined.

The Commonwealth Trust Company was liquidated in 1970. All of the $5.4 million paid to insured depositors was subsequently recovered. The Astra Trust Company was liquidated in 1980. Insured depositors were paid $21.6 million. To the end of 1984, all but $3.5 million was recovered. In 1983, following the liquidation of the Amic Mortgage Investment Corporation, the CDIC paid claims to its insured depositors amounting to $22.8 million of which $7.8 million remained outstanding at the end of 1984 as did the entire $27.8 million paid to depositors of Northguard Mortgage which had been placed into liquidation during the year. During the first four months of 1985, three more institutions were liquidated - Pioneer Trust, Western Capital Trust and London Loan Company. The CDIC paid their depositors a total of $305 million.

With the failure of the District Trust Company in 1982, and in the following year Crown Trust, Greymac Trust, Seaway Trust, Seaway Mortgage Corporation, Greymac Mortgage Corporation and Fidelity Trust, instead of immediate liquidation, the CDIC, following termination of their activities by their respective regulatory authority, entered into agency and operating agreements with other member institutions. These institutions, as agents of the

CDIC, agreed to administer over a five-year period the assets and liabilities of the troubled institutions. During the winding-down period the CDIC advances funds and guarantees funds advanced by agents as required to meet depositors' claims as they fall due. Unlike immediate liquidation where the CDIC's liability is limited only to the insured deposits held with the institutions in receivership, with the agency and administration approach all depositors are in effect guaranteed repayment of their funds. As at December 31, 1984, loans made directly by the CDIC or by its agents to the six institutions still remaining under agency and administrative agreements amounted to $925 million.[48] In its 1983 fiscal year the CDIC recorded a general provision for loss of $650 million which was increased o $1,250 million in 1984. This provision reflects its liability with respect to outstanding and further loans under the agency and administration agreements.

In March 1985, when the Canadian Commercial Bank was threatened with failure, the Inspector General of Banks negotiated a $255 loan package to ensure its solvency. The CDIC agreed to provide $75 million (estimated to be the amount it would have to pay to insured depositors in the event of insolvency) with the remaining $180 million shared equally by the Province of Alberta, the Government of Canada, and a banking group in the amount of $60 million each.

(iii) Solvency Regulations

The need for solvency regulations to satisfy the safety and soundness objectives of public policy depends upon how the deposit insurance system is structured. With a credible risk-related insurance premium system most of the present solvency regulations would be superfluous. The retention of some regulations would be necessary only insofar as information asymetries cannot be reduced. As has already been suggested, more adequate monitoring with on-site

examination and the provision of incentives to institutions to reveal the true nature of their risks are effective means for reducing present information asymetries.

Solvency regulations can be classified into five general categories of constraints: entry restrictions, activity restrictions, pricing constraints, balance sheet constraints and restrictions on insider conduct.

Entry restrictions which limit the number of institutions and competition have been used to enhance solvency by stabilizing the profits of existing institutions. It is now generally recognized that the consequent efficiency loss is too large to justify the contribution that such entry restrictions may make to solvency. However, entry restrictions that prevent unscrupulous ownership and management protect solvency with no loss in efficiency.

Activity restrictions are another form of entry barrier. Traditionally, Canadian depository institutions have been precluded from most non-financial business activity. However, while not engaging directly in such activities, they have increasingly participated indirectly as merchant bankers. Recent experience shows that combining market intermediation activities with financial intermedion adds risk to the latter. Morevover with a level premium deposit insurance system and de facto government guarantees of depository institutions' liabilities, government indirectly subsidizes market intermediation. Hence, not only is the solvency of financial intermediaries threatened but also the efficiency of market intermediation.

From the solvency point of view, restricting depository institutions choice of activities can have both positive and negative effects. The former result if the prohibited activities add information asymetries that provide them with the incentive to imprudently engage in certain high risk activities. The

latter result when activity restrictions constrain diversification. Merrick and Saunders (1985) point out that activity restrictions should not rule out risky activities per se, but only inhibit the ability of institutions to sureptitiously increase risk after the market and insurers set their risk premiums.

The Green Paper proposed the establishment of financial holding companies as a means of allowing financial intermediaries to engage in a broader range of activities and to offer the public a wider selection of financial services in a "one-stop shopping" environment. American experience with financial holding companies shows that the solvency of a depository institution cannot be insulated effectively from other parts of its holding company that are subject to common management. (Eisenbeis (1983)) The latter is usually required if economies of scale or scope are to be exploited.

Restrictions that limit a depository institution's exposure to risk in a holding company structure include pricing, transactions, and capital transfer restrictions. Pricing restrictions limit the depository institutions' ability to transfer resources to its affiliates through the pricing of interaffiliate transactions. Transactions restrictions attempt to prevent risks from being transferred to depository institutions through credit extensions. Capital transfer restrictions limit the reductions in an institution's capital by preventing excessive dividend payments and stock purchases. Despite such restrictions, if intergration in a holding company structure is sufficiently close to allow economies of scope, deposit institution subsidiaries will be subject to what goes on in the rest of the organization.

Pricing constraints in the form of deposit interest rate ceilings were introduced in the United States during the 1930's. At the time it was assumed that if the banks paid higher interest rates, it would force them to hold higher

yielding, higher risk assets, and thereby make them more susceptible to failure. However, as was experienced during the 1970's, in an environment of high and volatile interest rates with sudden reversals in their yield curves, ceilings can result in mismatch risks when they are not adjusted to allow for such changes. In the absence of deposit ceilings, institutions' deposit pricing behaviour contains information about risk behaviour that is helpful to both regulators and the deposit insurer.

Solvency regulations on depository institutions' balance sheet have placed restrictions on their investments and have specified liquidity and capital standards. Investment rules can take two forms: qualitative rules which relate to the soundness of individual investments and quantitative rules which relate to the soundness of the asset portfolio. Qualitative rules are a substitute for regulatory monitoring and in some instances may be more cost effective than monitoring. However, monitoring costs can be reduced by passing them on to the institution being monitored which would then have to incentive to reveal to the regulator and insurer the quality of its assets. Quantitative rules, on the other hand, attempt to lower the risk of institutions' investment portfolios by requiring them to diversify their investments both geogaphically and sectorally. Regulations that "prohibit" portfolio concentration are <u>sine quo non</u> for avoiding large exposure to risk. Only a brief reading of banking history reveals that depository institutions are extremely vulnerable to severe economic shocks that affect a large proportion of their assets. Had it not been for their diversified portfolios, many more depository institutions would have failed during the more recent shocks to the fishing, commercial real estate and energy sectors as well as to the developing countries.

It is usually assumed that by setting higher primary capital standards an institution is made sounder because its shareholders have a higher stake in

its success; an argument frequently also used to defend closely held ownership. However, as was pointed out earlier in Part II, higher primary capital requirements can result in owners and their managers assuming more rather than less risk. Only, insofar as higher capital standards increase confidence in depository institutions and thereby make them less prone to runs, do they make a significant contribution to solvency.

Rules or guidelines that impose capital standards also are a means of shifting risk from the deposit insurer to holders of capital . Higher primary capital standards shift risk to shareholders while higher secondary capital shift risk to subordinated debtholders. Since subordinated debtholders do not share in the benefits of an institution's risks that pay off, they have an incentive to force them to control risks to assure their solvency. Moreover, where subordinated debt contracts include covenants that restrain an institution's behaviour, this type of debt serves as a substitute for regulation.

Capital adequacy standards can serve as a substitute for risk related deposit insurance if capital holders have the incentive to monitor the risk-taking behaviour of their institutions. Since information asymetries are probably greater for holders of capital than for the deposit insurer, the latter has a comparative advantage for protecting depository institutions' solvency.

Regulation of insider misconduct has been proposed against the risk of moral or fiduciary failure. No matter how well designed, insider misconduct rules are subject to clever circumvention. For example, the prohibition of a loan to an insider can be disguised with a loan to an arms-length party who in turn makes the proceeds available to the prohibited party. Since self dealing can either enhance or threaten an institution's solvency, framing appropriate regulations presents a dilemma. At best, regulations probably should do no more than specify internal control structures to be maintained by institutions with

the provision for severe penalties for misconduct. Penalties under the Criminal Code should supplement those that can be imposed by government regulators. To further deter insider misconduct, directors and officers of depository institutions should not be allowed to be protected by employment contracts which provide them with compensation upon resignation or dismissal. It can also be argued that the greater the competitive pressure, the more managers will be measured by the competitive yardstick, and the less will be the opportunity to indulge in injurious self-dealing. The potential for self-dealing also appears to be less in widely held rather than closely held institutions.

It has been argued that when deposit insurance is explicitly priced to reflect an institution's exposure toward risk, the only reason for solvency regulation is to compensate for information asymetries and consequent monitoring costs. In the absence of explicit insurance pricing, solvency regulations can be used by the insurer to implicitly price insurance. For example, solvency regulations can be imposed as penalties which esculate as an institution's behaviour becomes riskier (see Buser, Chen and Kane (1981)). Since such implicit risk based insurance premiums are a cost to the institution in the form of loss of anticipated profits, it will have an incentive to control its risks. Efficiency losses usually associated with solvency regulations are lower when restrictions serve as implicit insurance premiums imposed only on an offending institution.

Financial regulations have been considered primarily in terms of their contribution to solvency. Since regulations also may be desired to satisfy other public policy objectives one has to be concerned with how in these other roles they may impinge upon solvency. It has been suggested (Porter Royal Commission (1964) and the Economic Council of Canada (1976)), that the regulation of activities of depository institutions should be on a

function-by-function basis. While such an approach to financial regulation has many advantages, since it is institutions and not functions that become insolvent, regulations, at least in part, must remain focussed on institutions.

Finally, there is the question of who should be responsible for regulating and monitoring of depository institutions. Deposit taking is now undertaken by different types of institutions which may be regulated in either provincial and federal jurisdictions. This calls for much more co-operation than has been the case, and for a much more important role to be assigned to the government deposit insurer.

(iv) Disclosure Rules

The major difficulty with any type of insurance is moral hazard because the insured usually have better information about the true nature of their risks than does the insurer. As has been noted above, this creates the need for solvency regulations to supplement deposit insurance. However this need is reduced with rules that require institutions to disclose their behaviour on a timely basis, and with on-site monitoring. It has also been suggested that incentives can be provided to encourage institutions to reveal the true nature of their risks and that penalties should be imposed where it is found that information has been withheld or was knowingly incorrect.

There will always be disagreement over the extent to which information can be made available to the public. Increased public disclosure will be resisted by institutions for reasons of competitive confidentiality and by regulators because of the dangers of overreactions. Similar arguments were used in the debate on whether the chartered banks should be required to disclose to the public the amount of their inner reserves. The requirement for disclosure does not appear to have adversely affected the operations or solvency of the banks.

One cannot expect additional information to increase private sector surveillance very much without shifting more risk to it. Requiring institutions to hold more subordinated debt would serve this purpose. In addition, uninsured depositors would monitor an institution's risk if de facto guarantees were removed. For example, when CDIC uses agency and operating agreements to wind-down solvent institutions it could pay off uninsured depositors at only its estimated value of recoveries.

(v) Self-regulation

Our approach toward maintaining a balance between soundness and risk-taking as well as soundness and efficiency, involves reinforcing, or duplicating by other means, disciplines inherent in the market place. Toward this end we have made the case for risk based insurance premiums, priced both explicitly and implicitly. This approach allows for a greater degree of self-regulation. However, to ensure that self-regulation pays appropriate attention to externalities of institutional behaviour, mandated internal corporate structures seem desirable. For example, an institution's board of directors should consist of a certain proportion of outside directors with specified qualifications. Moreover, certain internal committees should also be mandatory and representation on these committees should include outside directors. Minutes of all required committees would be readily available to government regulators. Monitored self-regulation appears to be the most effective way to control abuses that arise as a result of conflicts of interest and self-dealing. Institutions would be required to establish "Chinese Walls" to control conflicts of interest and outside directors and regulators would be responsible to see that these walls did not become mere "garden fences".

CONCLUSIONS

In the 1970's induced by accelerated and anticipated inflation, and more competition fostered in large part by technological and financial innovation at home and abroad, depository institutions' asset transformation underwent a metamorphosis to accommodate itself to this new environment. As a result these institutions increased their exposure to risks which have been identified as credit risk, interest rate risk, funding risk, contingency liability risk, management risk and delivery risk. These risks become excessive when they threaten an institution's solvency which happened to some thirty institutions which either failed completely or were rescued from failure.

Deposit insurance, introduced in 1967 essentially to protect small unsophisticated depositors, has unwittingly provided insured institutions with an incentive to increase their risk exposure. Because institutions do not pay correspondingly higher insurance premium rates when they invest in higher risk assets or partake in riskier activities, they are encouraged to enhance their expected returns by increasing their risk exposure. Moreover, deposit insurance, and more recently de facto protection provided by the CDIC and governments to uninsured depositors and other creditors of insured institutions also has resulted in the public's perception that their funds are fully protected. As a result the public has little or no incentive to monitor the behaviour of these institutions. The ultimate cost of excessive risk taking which results in institutional failure is born by the CDIC and governments. In addition, when the public has little or no incentive to monitor the behaviour of institutions and institutions have an incentive to assume excessive risks, the stability and soundness of the financial system is threatened and risk bearing is inefficient.

Three types of reforms that address these problems have been considered: those that reinforce or duplicate by other means, disciplines in the market process, solvency regulations and self regulation. Direct market discipline is increased with lower capital leverage ratios, especially where this takes the form of additional subordinated debt. Government risk-based deposit insurance can serve as a surrogate for direct market discipline. It has been argued that it is possible to implement a credible risk-based premium system. Despite the existence of information asymetries, institutions can be classified according to their risk behaviour. Moreover, present information asymetries can be reduced significantly with disclosure rules, incentives and/or penalties that induce institutions to reveal the nature of their risks, on-site monitoring, and the use of early warning systems.

Lower capital leverage ratios and a credible risk-related deposit insurance system would render many solvency regulations superfluous. In the absence of explicit deposit insurance pricing, solvency regulations can be used to implicitly price insurance.

Regardless of the deposit insurance system chosen, the solvency of institutions is enhanced with regulations that prohibit "extreme" portfolio concentrations, and insider misconduct, and prevent entry of unscrupulous owners and managers.

Our approach with respect ro deposit insurance, capital leverage ratios and solvency regulations allows for a greater degree of self-regulation. However, to ensure that self-regulation pays appropriate attention to externalities of institutional behaviour, mandated internal corporate structures are recommended.

Finally, the regulatory framework cannot, and should not, make individual depository institutions immune from the theraputic and disciplinary

roles of exit. Mistakes are inevitable in a dynamic, innovative and competitive environment. Policy must allow unsound and poorly managed institutions to fail but at the same time protect the safety and soundness of the system.

A depository institution should be considered insolvent when the present value of its expected cash flow over some appropriate period falls short of its real net worth. Since closure usually involves externalities beyond the direct costs borne by the deposit insurer, ordering liquidation probably should remain the prerogative of the court. However, the CDIC should become the liquidator if it so choses, and have the authority to close an institution in a manner that takes into consideration not only its own liability but also the possible disruptive effects to financial intermediation and the economy.

FOOTNOTES

1. The size of an individual loan was a major factor causing solvency problems for Unity Bank prior to being merged with the Provincial Bank of Canada in 1977.

2. For a discussion of the risks associated with project financing see Benson (1980).

3. The removal of the 6 percent ceiling on bank loans in 1967 and the lower cash reserve required introduced in 1980, among other legislative changes, gave the banks the incentive to diversify their loan portfolios.

4. Not all foreign currency business can be strictly classified as foreign insofar as some of it is booked in Canada.

5. In the Disclosure Guidelines which became effective on November 1, 1984, the Inspector General of Banks defined non-performing loans as non-accrual loans and renegotiated reduced rate loans. Non-accrual loans are defined as loans on which interest is not being accrued due to the existence of reasonable doubt as to the ultimate collectibility of principal or interest. Loans where interest is contractually past due 90 days are automatically to be placed on a non-accrual basis unless management determines that there is not reasonable doubt about collectibility. "Renegotiated reduced rate loans" are defined as non-personel loans where terms have been modified to provide for a reduction in the interest rate due to the weakened financial condition of the borrower. Non-accrual loans include term preferred shares, income debentures, small business loans, small business development bonds that qualify as loan substitutes and deposits with banks. (see Bank Act and Orders and Regulations with Guidelines and Rules (1984): 433-451.)

6. In 1984, because of the adverse effects on its income from the previous three years loss experience, the Inspector General of Banks allowed the Bank of British Columbia following its financial restructuring, to exclude the previous years' losses in calculating its loan loss provision. (Globe and Mail, Nov 12, 1984)

7. In the United States, the International Lending Supervision Act introduced in 1983, requires banks to disclose detailed information on their foreign lending activity and provides for special reserves called an Allocated Transfer Risk Reserve. See Young (1985) and Paul Volcher, Federal Reserve Bulletin, Board of Governors of the Federal Reserve System, April 1983 p. 277.

8. There is an expanding literature on measures of interest rate sensitivity and techniques to control associated risks. See Bierwag (1978), Bierwag, Kaufman and Toevs (1983), Cooper (1977), Fischer and Weil (1971),Grove (1974), Hicks (1939) 184-88, Ingersoll, Skelton and Weil (1978), Kaufman (1984), Macaulay (1938), Samuelson (1944), Weil (1973).

9. Alternatively, one can define the gap in terms of the difference between fixed-rate assets (FRA) and fixed-rate liabilities (FRL) and a positive gap as FRL FRA.

FOOTNOTES

10. Duration is computed by weighting the present value of each future cash flow by the number of periods until the receipt of payment and then dividing by the current price of the financial instrument, or

$$D = \frac{\sum_{t=1}^{N} t PV_t}{\sum_{t=1}^{N} PV_t} \qquad \text{where } PV_t = \frac{C_t}{(1+i)^t}$$

where D is duration; t is the length of time (number of months, years etc.) from the present to the time of payment; PV_t the present value of a payment C_t scheduled t years from the present; i the appropriate discount rate and $\sum_{t=1}^{N}$ the summation from the first to the last payment (N).

11. The duration of the bond is computed using the formula in footnote 9 as follows:

$$2.7 = \frac{(1)\ (100)}{1.1} + \frac{(2)\ 100}{1.1} + \frac{(3)\ (110)}{1.1}$$

12. This is an approximation of a more complicated relationship.

13. Duration gap is defined as: $DG = D_a - D_e\left[L/A\right]$

where D_a and D_e are the durations of assets and liabilities respectively; A is the market value of an institution's assets and L that of its liabilities. The percentage change in net worth as a result of an unexpected interest rate change Δi is:

$$\Delta NW/NW = (-DG)(\Delta i)$$

14. To avoid this problem associated with variable-rate loans, institutions can make fixed-rate loans and then hedge the interest rate risk in the futures market. These so-called synthetic fixed-rate loans effectively insulate an institution from interest rate risk while providing the borrower with a fixed loan rate. (See Dew and Marted, 1981)

15. See Belongia and Santoni (1984); Begert and Capozza (1984); Draenstott and McDonley (1982); Keen (1980); Koch, Steinhauser and Whigham (1982); Mitchell (1985); Booth, Smith and Stolz (1984)

16. Calculated from Table D2, Bank of Canada Review, August 1985.

17. See Chris Robinson and Alan White, "Bank-backed Preferred Shares Under Scrutiny", Globe and Mail, Toronto Nov. 17 1984.

18. See Demsetz (1968), Diamond (1984), Fama (1980), Harris and Raviv (1979), Holmstrøm (1979), Jensen and Meckling (1976), Marshall (1976), Pauly (1968), Shavell (1979), Rothschild and Stiglitz (1976), Ross (1973).

19. Kane (1985) has observed that "... like acrobats working with the benefit of a safety net, insureds can afford to be more daring than they could if they were not able to rely on insurance coverage to truncate their losses".

FOOTNOTES

20. See Christopher Woddell, "CCB Report Describes Bank in Chaos", Globe and Mail, Toronto, October 10, 1985; House of Commons, Standing Committee on Finance, Trade and Economic Affairs, Report: Canadian Commercial Bank, Issue No. 41, 1985.

21. See Exhibit 7 "Canadian Commercial Bank Report by George C. Hitchman", submitted Oct 9th, 1985 to Supreme Court Judge Willard Estey's investigation of the failure of the bank.

22. Or more precisely, insolvency occurs when the market value of an institution's assets falls below the present value of its contractual liabilities (discounted at the risk-free rate).

23. Barth et al (1985) estimated that in early 1985 there were more than 400 thrift institutions in the United States whose net worth was negative and approximately 900 whose net worth was less than three percent of their assets.

24. The appointment of a liquidator for the Northland Bank was delayed by the Court because prior to the application for a court order no special meetings of shareholders and creditors as specified in the Winding-up Act was held. (See Arthur Johnson, "Judge Delays Repayments by Northland", Globe and Mail, Toronto, October 5, 1985.)

25. See Bennett (1984), Federal Deposit Insurance Corporation (1983A) and (1983B), Horvitz (1975).

26. In the rescue plan the FDIC accepted the equivalent of 80 percent of Continental Illinois Corporation's equity and assumed as much as $4.5 billion in problem loans.

27. see Tim Carrington, "U.S. Won't Let 11 Biggest Banks in Nation Fail", Wall Street Journal, 20 September 1984.

28. For a more complete discussion of the functions of bank capital see Orgler and Wolkowitz (1976).

29. The major difference in the calculation of leverage ratios between Canada and American regulatory authorities is the Canadian deduction of shares of associated companies and the American inclusion of allowance for loan losses in the calculation of primary capital and the Canadian inclusion of off-balance sheet items in the asset base for calculating the leverage ratio. These differences tend to make Canadian ratios lower than their American counterparts. (For U.S. calculations see Gilbert, Stone and Trebing (1985)).

30. Bank Act and Orders and Regulations with Guidelines and Rules (1984) p 430.

31. The Inspector General of Banks has also set total capital leverage guidelines of from 20:1 to 25:1 for foreign bank susidiaries. See Ibid, 430-432.

FOOTNOTES

32. Regulatory guidelines in the U.S. permit a banking company to maintain up to one-third of its overall capital in the form of debt with an original maturity in excess of seven years.

33. See Barry Critchley, "Cozy Trusts and Banks are Under Scrutiny", The Financial Post, October 6, 1984.

34. The bank regulatory agencies in the United States have set minimum standards for the ratio of primary capital to total assets of 5.5 percent and 6 percent for the ratio of total capital to total assets; these percentages translate into leverage ratios of 18.2 and 16.7. A Treasury Department study group and the Federal Deposit Insurance Corporation have suggested a capital-to-asset standard of 9 percent (a leverage ratio of only 11.11). The American banking system in the aggregate currently has a capital/asset ratio of slightly more than 7 percent (14.3 leverage ratio) (see Gilbert, Stone and Trebing (1985).

35. Before the Bank Act revisions of 1980 the Canadian banks were restricted to common stock issues with pre-emptive rights which required them of offer additional shares on a pro-rata basis to existing shareholders. Low stock prices kept them from selling new shares to raise capital because they considered consequent dilution too detrimental to their existing shareholders.

36. case of some institutions that failed, their primarily capital also was inflated by taking interest or discount receivable on loans into income during the first year.

37. see Bentson (1973); Bentson and Marlin (1974).

38. similar conclusions have been reported by Sinkey (1977) and (1979).

39. For a discussing of statistical techniques used see Collins and Green (1982).

40. On the other hand, Ho and Saunders (1980 p 1189) have observed that "... recent trends toward lower capital-deposit ratios, poorer quality loans and a reliance on borrowed funds make an examination of catastrophe conditions increasingly pertinent. Especially as the unexpected failure of even a single bank could adversely effect depositors and investors confidence as to the soundness of the banking system and ultimately of the payment mechanism itself". They apply a theory of catastrophy to bank failure and show how the interaction between bank management, regulators and depositors can induce catastrophic failure.

41. For a brief description of some of the methodology used see Flannery and Guttenlag (1979), Putnam (1983).

42. For a discussion of the incentive problems created by flat fee deposit insurance see Flannery (1982); Kareken and Wallace (1978); Kareken 1931 and 1983; Short and O'Driscoll (1983).

FOOTNOTES

43. See also Merton (1978), Pyle (1983) and (1984).

44. The Federal Deposit Insurance Corporation (1983A) in the United States has recommended that depositors be fully insured up to a certain limit and partially insured for amounts above this limit.

45. Between 1972 and 1977 the CDIC paid the Federal Government dividends amounting to $4.3 million.

46. The federal government included in its Supplementary Estimates (B) for the 1985-86 fiscal year, tabled in the House of Commons on November 6, 1985, a $965 million loan to the CDIC. During 1985, in addition to the payments shown in the table, the CDIC paid depositors of the failed Continental Trust and the Canadian Commercial Bank.

47. In the United States all savings and loan institutions insured by the Federal Savings and Loan Insurance Corporation pay premiums at the rate of one-twelfth of one percent of their total deposits. Banks insured by the Federal Deposit Insurance Corporations pay premiums at the same rate but only on their assessable deposits. However, at the end of each year the banks may receive rebates of 60 percent of the amount by which the sum of collected premiums exceed the FDIC's operating expenses and insurance losses. Because of its rebate policy during the 1970's the net rate paid was less than 1/25 of one percent and more recently 1/14 of one percent.

48. Loans made by agents on behalf of CDIC are in effect loans by the agents to the CDIC for which it pays interest.

REFERENCES

Avery, Robert B., and Gerald A. Hanweck, (1984) "A Dynamic Analysis of Bank Failures" Proceedings of a Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, 380-401.

Baer, Herbert (1985) "Private Prices, Public Insurance: The Pricing of Federal Deposit Insurance", Federal Reserve Bank of Chicago, Economic Perspectives, September/October: 45-57.

Bank Act and Orders and Regulations with Guidelines and Rules (1984) prepared by McCarthy & McCarthy, Don Mills, Richard De Boo Publishers.

Bank Profits (1982), A Report by the Standing Committee on Finance, Trade and Economic Affairs, Ottawa, House of Commons, July 27.

Barnett Robert E., Paul M. Horvitz and Stanley C. Silverberg, (1977) "Deposit Insurance: The Present System and Some Alternatives", The Banking Law Journal 94, 304-331.

Barth James R., R. Dan Brumbaugh, Jr., Daniel Sauerhaft and George H.K. Wang, (1985), Thrift-Institution Failures: Causes and Policy Issues", Federal Reserve Bank of Chicago, Proceedings of a Conference on Bank Structure and Competition (forthcoming).

Belongia, Michael T. and G.J. Santoni, (1984) "Hedging Interest Rate Risk with Financial Futures: Some Basic Principles" Federal Reserve Bank of St Louis, Review, 66 no 8; 15-25.

Begert, Brian and Dennis R. Capozza, (1984) Reviving Fixed-rate Loans Through Financial Futures", Canadian Banker, 91-2: 12-17.

Bennet, Barbara, A. (1984), "Bank Regulation and Deposit Insurance: Controlling the FDIC's Losses", Economic Review, Federal Reserve Bank of San Francisco, Spring: 16-30.

Benson, R. Neil, (1980) "Project Financing - Banking's Response to a New Environment", The Canadian Banker & Icb Review, 87 No 6: 22-29.

Benston, George J. (1973) "Bank Examination", The Bulletin, New York University Graduate School of Business Administration, Institute of Finance Nos. 89-90.

Benston, George. J. and John Tepper Marlin, (1974) "Bank Examiners' Evaluation of Credit: An Analysis of the Usefulness of Substandard Loan Data", Journal of Money, Credit and Banking, 6: 23-44.

Benston, George, Gerry Hanweck and David Humphrey (1982) "Scale Economies in Banking: A Restructuring and Reassessment", Journal of Money, Credit and Banking, 14: 435-456.

Benston, George F. (1983) "Deposit Insurance and Bank Failure", Federal Reserve Bank of Atlanta, Economic Review, March: 4-17.

Bernanke, Benjamin (1983) Non-Monetary Effect of Financial Crisis During the Great Depression, American Economic Review 73, 257-276.

Bierwag, GO. (1978) "Measures of Duration", Economic Inquiry, 16, 497-507.

Bierwag, Gerarld O. and George G. Kaufman (1983) "A Proposal for Federal Deposit Insurance With Risk Sensitive Premiums", Proceedings of a Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, 223-242.

Bierwag, G.O., G.G. Kaufman and A. Toevs (1983) "Duration: Its Development and Use in Bond Portfolio Management", Financial Analysts Journal, July-August: 15-35.

Bierwag, G.O., George G. Kaufman and Alden L. Toevs (1983) "Immunization for Multiple Planning Periods" Journal of Finance and Quantitative Analysis.

Bierwag, G.O., George G. Kaufman and Alden Toevs, (1983) "Bond Portfolio Immunization and Stochastic Process Risk", Journal of Bank Research, Winter: 282-91.

Binhammer, H.H. and Jane Williams, (1976), Deposit-Taking Institutions: Innovation and the Process of Change, Ottawa, Minister of Supply and Services Canada.

Binhammer, H.H. (1985) "Reforming Canadian Government Deposit Insurance", Ottawa, Minutes of Proceedings and Evidence of the Standing Committee on Finance, Trade and Economic Affairs, No. 49, July 10, 49A:5 - 35.

Board of Governors of the Federal Reserve System, (1984), The Federal Reserve System Purposes and Functions, Washington, D.C.

Booth, James R., Richard L. Smith and Richard W. Stolz, (1984), "Use of Interest Rate Futures by Financial Institutions, Journal of Bank Research, 15-20.

Bovenzi, John F., James A. Marino and Frank E.McFadden, "Commercial Bank Failure, Prediction Models" (1983) Economic Review, Federal Reserve Bank of Atlanta 68: 14-26.

Bovenzi, John and Lynn Nejezchleb (1985) "Bank Failures: Why Are There so Many" Issues in Bank Regulation, Winter 1985 54-68.

Boyd, John H. (1983) "Deposit Insurance Premium Setting; Its Effects on Portfolio Allocations and Risk of Insured Institutions, Proceedings of a Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, 210-222.

Bryant, John (1980) "A Model of Reserves, Bank Runs, and Deposit Insurance", Journal of Banking and Finance 4: 335-344.

Buser, Stephen A., Andrew W. Chen and Edward J. Kane, (1981) "Federal Deposit Insurance, Regulatory Policy, and Optimal Bank Capital", Journal of Finance 35: 51-60.

Calem, Paul (1984), "Bank Holding Companies and The Potential for Anticompetitive Practices", Federal Reserve Bank of Chicago, Proceedings of a Conference on Bank Struture and Competition, 184-198.

Campbell Tim S. and David Glenn, (1984) "Deposit Insurance in a Deregulated Environment", Journal of Finance, 39: 775-785.

Canada, Department of Finance, (1985) The Regulation of Financial Institutions: Proposals for Discussion (Technical Supplement).

Canada, Department of Finance (1985) The Regulation of Canadian Financial Institutions: Proposals for Discussion (Green Paper).

Canada, House of Commons, Minutes of Proceedings of the Standing Committee on Finance Trade and Economic Affairs.

Clair, Robert T., (1984) "Deposit Insurance, Moral Hazard, and Credit Unions", Federal Reserve Bank of Dallas, Economic Review July: 1-12.

Collins Robert A. and Richard D. Green (1982) "Statistical Methods of Bankruptcy Forcasting", Journal of Economics and Business, 34: 349-354.

Cooper, Ian (1977) "Asset Changing Interest Rates and Duration" Journal of Financial and Quantitative Analysis, 201-723.

Demsetz, H. (1969) "Information and Efficiency: Another Viewpoint", Journal of Law and Economics 12: 1-22.

Dew, James, Kurt and Terrance F. Marted (1981), "Treasury Bill Futures, Commercial Lending and Synthetic Fixed Rate Loan", Journal of Commercial Lending, June, 17-38.

Diamond, Douglas W. (1984) "Financial Intermediation and Delegated Monitoring", Review of Economic Studies, 51: 393-414.

Diamond, Douglas W. and Philip H. Dybvig (1983), "Bank Runs, Deposit Insurance and Liquidity", Journal of Political Economy, 91: 401-419.

Drasbenstott, Mark and Anne O'Mara McDonley, (1982) "The Effect of Financial Fut ures on Small Bank Performance", Federal Reserve Bank of Kansas City, Economic Review, November, 16-31.

Efficiency and Regulation: A Study of Deposit Institutions (1976), Ottawa, Economic Council of Canada.

Eisenbeis, Robert, A. (1977) "Financial Early Warning Systems: Status and Future Directions" Issues in Bank Regulation, Summer 8-12.

Eisenbeis, Robert, A. (1983) "Bank Holding Companies and Public Policy" in The American Assembly, Columbia University, Financial Services: The Changing Institutions and Government Policy, Englewood Cliffs, New Jersey, Prentice-Hall, Inc., 127-155.

Fama, E.F. (1980) "Agency Problems and the Theory of the Firm", Journal of Political Economy, 88: 288-307.

Federal Deposit Insurance Corporation, (1983A) Deposit Insurance in a Changing Environment, A Report on Deposit Insurance to the Congress from the Federal Deposit Insurance Corporation (Washington, DC April 15, 1983).

Federal Deposit Insurance Corporation (1983B) The First Fifty Years: A History of the FDIC 1933-1983. Washington.

Federal Home Loan Bank Board, Agenda for Reform, a report on deposit insurance to the Congress from the Federal Home Loan Bank Board (Washington DC March 1983).

Final Report of the Working Committee on the Canadian Deposit Insurance Corporation (CDIC), (1984), Ottawa, Minister of Supply and Services Canada.

Fischer, Lawrence, and Roman Weil, (1971), "Coping with the Risk of Interest Rate Fluctuations: Returns to Bondholders from Naive and Optimal Strategies", Journal of Business, 408-31.

Flannery, Mark J. (1980) "A Method for Empirically Assessing the Import of Marke Market Interest Rates on Intermediary Profitability", Proceedings of a Conference on Bank Structure & Competition, Federal Reserve Bank of Chicago, 1-15.

Flannery, Mark J., and Aris A. Protopapadakis (1984) "Risk-Sensitive Deposit Insurance Premia: Some Practical Issues, Federal Bank of Philadelphia, Business Review September/October : 3-10.

Flannery, Mark J. and Jack M. Guttentag, (1979) "Identifying Problem Banks", Proceedings of a Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago. 1-32.

Flannery, Mark J. (1982) "Deposit Insurance Creates a Need for Bank Regulation" Business Review, Federal Reserve Bank of Philadelphia, Business Review January/February, 17-27.

Freedman, C. (1983) "Financial Innovation in Canada: Causes and Consequences", American Economic Review. 73:101-106.

Freedman, C., (1985) "Recent Developments in The Structure and Regulation of the Canadian Financial System", Proceedings of the SUERF Conference on "Shifting Frontiers in Financial Markets".

Friedman, Milton, and Anna J. Schwartz, (1963), A Monetary History of the United States 1867-1960, Princeton, N.J., Princeton University Press.

Furlong, Frederick T. (1984) "A View of Deposit Insurance Coverage", Federal Reserve Bank of San Francisco, Economic Review, Spring: 31-37.

Gambs, Carl M. (1977) "Bank Failures, An Historical Perspective", Federal Reserve Bank of Kansas City, Monthly Review, June: 10-20.

Gilbert, Alton, Courtenay C. Stone and Michael Trebing, (1985), "The New Bank Capital Adequacy Standards", Federal Reserve Bank of St. Louis Review, May, 12-20.

Gilligan, Thomas, Michael Smirlock and William Marshall, (1984) "Scale and Scope Economics in the Multi-Product Banking Firm", Journal of Monetary Economics, 13, 393-405.

Gjesdul, F. (1982) Information and Incentives: The Agency Information Problem, Review of Economic Studies 64, 373-90.

Goldberg, Ellen S., Edward J. Altman and Edward E. Furash, (1983) Off-Balance Sheet Activities of Banks: Managing the Risk/Reward Trade-Offs, Philadelphia, Robert Morris Associates.

Goodman, Laurie and Sherrill Shaffer (1984), "The Economics of Deposit Insurance: A Critical Evaluation of Proposed Reforms", Yale Journal on Regulation, 2, 145-62.

Grove, M.A. (1974) "On Duration and the Optimal Maturity Structures of the Balance Sheet" Bell Journal of Economics and Management Science, 5, No. 2, 517-557.

Hanweck, Gerald A., (1977) "Predicting Bank Failure", Research Papers in Banking and Financial Economics, Financial Studies Section, Board of Governors of the Fe Federal Reserve System, Washington, D.C.

Harris, Milton and Artur Raviv (1979), "Optimal Incentive Contracts with Imperfect Information" Journal of Economics, 20: 231-260.

Hicks, J.R. (1939), Value and Capital, Oxford Clarendon Press.

Ho, Thomas and Anthony Saunders, (1980) " A Catastrophe Model of Bank Failure", Journal of Finance, 35: 1189-1207.

Holmstrøm, B. (1979) "Moral Hazard and Observability", Bell Journal of Economics 10: 74-91.

Horvitz, Paul M., (1975) "Failures of Large Banks: Implications for Banking Supervision and Deposit Insurance", Journal of Financial and Quantitative Analysis, 10: 589-601.

Horvitz, Paul M., (1980) " A Reconsideration of the Role of Bank Examination", Journal of Money, Credit and Banking 12: 654-659.

Horvitz, Paul M., (1983), "The Case Against Risk-Related Deposit Insurance Premiums" Housing Finance Review 2: 253-263.

Horvitz, Paul M., (1984) "Market Discipline in Best Produced By Subordinated Creditors", American Banker, July 15, 4 and 8.

Ingersoll J., J. Skelton and R. Weil "Duration Forty Year Later", (1978) Journal of Financial and Quantitative Analysis, 627-650.

Interim Report of the Ontario Task Force on Financial Institutions, (1984), Ontario, Minister of Consumer and Commercial Relations.

Jensen M.C. and Meckling W.H. (1976) "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure", Journal of Financial Economics, 3: 305-360.

Juncker, George R., (1978) "A New Supervisory System for Rating Banks", Federal Reserve Bank of New York, Quarterly Review, 3: 47-50.

Kahane, Yehuda, (1977) "Capital Adequacy and the Regulation of Financial Intermediairies" Journal of Banking and Finance, 1: 207-18.

Kane, Edward, J. (1985) The Gathering Crisis in Federal Deposit Insurance, Cambridge, Mass., MIT Press.

Kanatas, George (1985) "Deposit Insurance and the Discount Window: Pricing Under Asymmetric Information" Banking Research Center Working Paper No. 120, Northwestern University.

Kareken, John H. and Neil Wallace, (1978), "Deposit Insurance and Bank Regulation: A Partial-Equilibrium Analysis", Journal of Business, 51: 413-38.

Kareken, John H., (1981) "Deregulating Commercial Banks: The Watchword Should be Caution", Federal Reserve Bank of Minneapolis Quarterly Review, Spring/Summer: 1-5.

Kareken, John H., (1983) "The First Step in Bank Deregulation: What About the FDIC" Papers and Proceedings of the American Economic Association, 73: 189-203.

Kareken, John H., (1983A) "Deposit Insurance Reform or Deregulation is the Cart,Not the Horse", Quarterly Review, Federal Reserve Bank of Minneapolis, (Spring), 1-9.

Kareken, John H., (1985) "Bank Regulation and the Effectiveness of Open Market Operations", Brooking's Papers on Economic Activity, No. 2, pp 405-444.

Kaufman, George, (1984) "Measuring and Managing Interest Risk: A Primer", Federal Reserve Bank of Chicago Economic Perspectives, January-February, 16-29.

Kaufman, George G., Larry M. Mote and Harvey Rosenblum (1984) Consequences of Deregulation for Commercial Banking. Journal of Finance 39: 789-803.

Keen, Howard, Jr., (1980) "Interest Rate Futures: A Challenge for Bankers", Federal Reserve Bank of Philadelphia, Business Review, November/December, 13-22.

Keeton, William R., "Deposit Insurance and the Deregulation of Deposit Rates", Federal Reserve Bank of Kansas Economic Review, April: 28-46.

Klein, Benjamin, and Keith B. Leffler, (1981) "The Role of Market Forces in Assuring Contractual Performance", Journal of Political Economy. 89: 615-41.

Klein, Michael, A. (1978) "The Implicit Deposit Rate Concept: Issues and Application", Federal Reserve Bank of Richmond, Economic Review 64: 3-12.

Koch, Donald L., Delores W. Steinhauser and Pamela Whigham, (1982) "Financial Futures as a Risk Management Tool for Banks and S&Ls", Federal Reserve Bank of Atlanta Economic Review, September, 4-14.

Koehn, Michael and Anthony M. Santomero, (1980) "Regulation of Bank Capital and Portfolio Risk", Journal of Finance, 35: 1235-44.

Korobow, Leon and David Stuhr, (1975) "Toward Early Warning of Changes in Banks' Financial Condition: A Progress Report" Federal Reserave Bank of New York, Monthly Review, July, 157-165.

Korobow Leon, David Stuhr and Daniel Martin, (1976) "A Probabilistic Approach to Early Warning Changes in Bank Financial Conditions", Federal Reserve Bank of New York, Monthly Review, July, 187-194.

Korobow, Leon, David Stuhr and Daniel Martin, (1977) "A Nationwide Test of Early Warning Research in Banking", Federal Reserve Bank of New York, Quarterly Review, 2: 37-52.

Macaulay, F.R., (1938) Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields and Stock Prices in the U.S. Since 1856, N.Y., National Bureau of Economic Research General Seires No. 33, Columbia University Press, 1938.

Marcus, Alan J. and Israel Shaked, (1984) "The Valuation of FDIC Insurance Using Option-Pricing Estimates", Journal of Money Credit and Banking, 16, 446-460.

Marshall, J.M. (1976) "Moral Hazard", American Economic Review, 66: 680-690.

Martin, Daniel (1977) "Early Warning of Bank Failure", Journal of Banking and Finance, 1: 249-276.

McComas, Maggie, (1985), "More Capital Won't Cure What Ails Banks", Fortune, Jan 7, 80-86.

McGuirk, Edward J. (1983), "Default Prevention, Financial Analysis and Modeling: the FSLIC Perspective", Journal, Federal Home Loan Bank Board, 18: 10-17.

Merrick, John J. Jr. and Anthony Saunders (1985) "Bank Regulation and Monetary Policy", Journal of Money, Credit and Banking, November, Part 2: 691-717.

Merton, Robert C. (1977) "An Analytic Derivation of the Cost of Deposit Insurance and Loan Guarantees: An Application of Modern Option Pricing Theory, Journal of Banking and Finance, 1: 3-1.

Merton, Robert, (1978) "On the Cost of Deposit Insurance When There are Surveillance Costs", Journal of Business, 51: 439-452.

Mingo, John J. (1976) "Managerial Motives, Market Structure and the Performance of Holding Company Banks", September, 411-24.

Mitchell, Karlyn, (1985) "Interest Rate Risk Management at Tenth District Banks", Federal Reserve Bank of Kansas, Economic Review May: 3-19.

Morgan, George, Emir, (1984) "On the Adequacy of Bank Capital Regulation", Journal of Finance and Quantitative Analysis, 19: 141-162.

Morris, John, (1984) "FASB Issues Rules for Futures Accounting, American Banker, August 24.

Nelson, Richard W. (1979) "Risk in Banking and its Determinants" (1979) Proceedings of a Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, 104-120.

O'Driscoll, Gerald, P. Jr. and Eugenie D. Short, (1983) "Deregulation and Deposit Insurance". Federal Reserve Bank of Dallas, Economic Review, September: 11-22.

Orgler, Yair (1975) "Capital Adequacy and Recoveries from Failed Banks", Journal of Finance, 1366-75.

Orgler, Yair E. and Benjamin Wolkowitz, (1976) Bank Capital, New York, Van Nostrand Reinhold Company.

Pauly, M.V. (1968) "The Economics of Moral Hazard: Comment, American Economic Review, 58: 531-537.

Peterson, Paul T., "The Case Against Risk-Related Deposit Insurance Premiums: A Contrary View", Housing Finance Review, July 1983, pp 265-268.

Pettway, Richard, H., (1980) "Potential Insolvency, Market Efficiency, and Bank Regulation of Large Commercial Banks", Journal of Finance and Quantitative Analysis, 15: 219-236.

Pettway, Richard H., and Joseph F. Sinkey, Jr., (1980) "Establishing On-Site Bank Examination Priorities: An Early-Warning System Using Accounting and Market Information" Journal of Finance 35: 137-50.

Proposals for Revision of the Loan and Trust Corporation Legislation and Administration in Ontario (November 1983), Ontario, Ministry of Consumer and Commercial Relations.

Putnam, Barron, H. (1983) "Financial Warning Systems and Financial Analysis in Bank Monitoring", Federal Reserve Bank of Atlanta, Economic Review, 6-13.

Pyle, D., (1983) "Pricing Deposit Insurance: The Effects of Measurement", Federal Reserve Bank of San Francisco working paper.

Pyle, David H., (1984) "Deregulation and Deposit Insurance Reform, Federal Reserve Bank of San Francisco Economic Review, 2, 5-15.

Report of the Royal Commission on Banking and Finance (1964), Ottawa, Queen's Printer and Controller of Stationery.

Rothschild, M. and Stiglitz J.E. (1976) Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information", Quarterly Journal of Economics, 40: 629-649.

Ross, S., (1973) "The Economic Theory of Agency: The Principal's Problem", American Economic Review, Papers and Proceedings, 63: 134-39.

Samuelson, P.A. (1944), "The Effect of Interest Rate Increases on the Banking System", American Economic Review 55: 16-27.

Santomero, Anthony M. and Ronald D. Watson, (1977) "Determining the Optimal Capital Standard for the Banking Industry", Journal of Finance, September, 1267-1281.

Scott, Kenneth and Thomas Mayer, (1971) "Risk and Regulation in Banking: Some Proposals for Federal Deposit Insurance Reform", Stanford Law Review 23: 857-902.

Shavell, S., (1979) "Risk Sharing and Incentives in the Principal and Agency Relationship", Bell Journal of Economics, 10: 55-73.

Short, Eugenie D., and Gerald P. O'Driscoll, Jr. (1983), "Deregulation and Deposit Insurance", Economic Review, Federal Reserve Bank of Dallas, September, 11-22.

Short Eugenie D., Gerald P. O'Driscoll, Jr and Franklin D. Berger, (1985) "Recent Bank Failures: Determinants and Consequences", mimeo.

Sinkey, Joseph, F. Jr. (1975) "A Multivariate Statistical Analysis of the Characteristics of Problem Banks" Journal of Finance 21-35.

Sinkey, Joseph F. Jr., (1977) "Problem and Failed Banks, Bank Examination, and Early Warning Systems": A Summary" In Edward I. Altman and Arnold W. Sametz, Financial Crisis: Institutions and Markets in a Fragile Environment, New York, John Wiley Interscience Inc., 24-47.

Sinkey, Joseph (1978) "Identifying Problem Banks", Journal of Money, Credit and Banking, 184-92.

Sinkey, Joseph, F. Jr., (1979) Problem and Failed Institutions in the Commercial Banking Industry, Greenwich, Conn, JA1 Press.

Sinkey, Joseph, F. (1984) "Risk Regulation in the Banking Industry", Federal Reserve Bank of Chicago, Proceedings of a Conference on Bank Structure and Competition 432-460.

Stiglitz, J.E., (1975) "Incentives, Risk and Information: Notes towards a Theory of Hierarchy, Bell Journal of Economics, 6: 552-79.

Talmore, Eli, (1980) "A Normative Approach to Bank Capital Adequacy" Journal of Finance and Quantitative Analysis, 14: 785-811.

The Canadian Bankers' Association (1984) "Comments on Deposit Insurance Reform", November, (Mimco).

Toevs, Alden L., (1983), "Gap Management: Managing Inter-Rate Risk in Banks and Thrifts", Federal Reserve Bank of San Francisco, Economic Review, No. 2: 20-35.

Trust Companies Association of Canada (February 1984) Submission on Proposals for the Revision of the Loan and Trust Corporation Legislation and Administration in Ontario.

Trust Companies Association of Canada (1985), Submission on the Organization and Operations of Canada Deposit Insurance Corporation, Toronto.

Tussig, A. Dale, (1967) "The Case for Bank Failure", Journal of Law and Economics, 10: 129-147.

Wall, Larry D. (1984) "The Future of Deposit Insurance: An Analysis of the Insuring Agencies' Proposals", Federal Reserve Bank of Atlanta, Economic Review, March: 26-39.

Wall, Larry, D. (1984) "Insulating Banks from Nonbank Affiliates", Federal Reserve Bank of Atlanta, Economic Review, September: 18-27.

Wall, Larry, D. (1985) "Regulation of Bank's Equity Capital" Economic Review, Federal Reserve Bank of Atlanta, November: 4-18.

Weil, Roman, L., (1973), "Macaulay's Duration: An Appreciation", Journal of Finance.

Wilson, C., (1971), "A Model of Insurance Markets with Incomplete Information", Journal of Economics Theory, 16, 167-207.

Wright, Richard, W., ed. (1983) International Dimensions of Canadian Banking, Addison-Wesley Publishers Limited for Institute of Canadian Bankers.

Young, John E. (1984) "Supervision of Bank Foreign Lending" Federal Reserve Bank of Kansas, Economic Review, 31-39.